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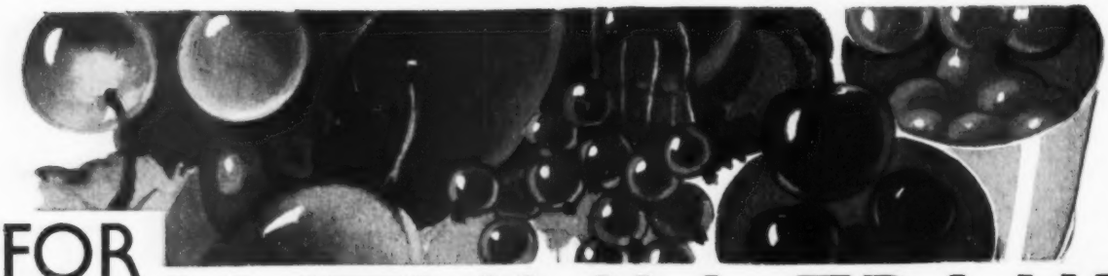

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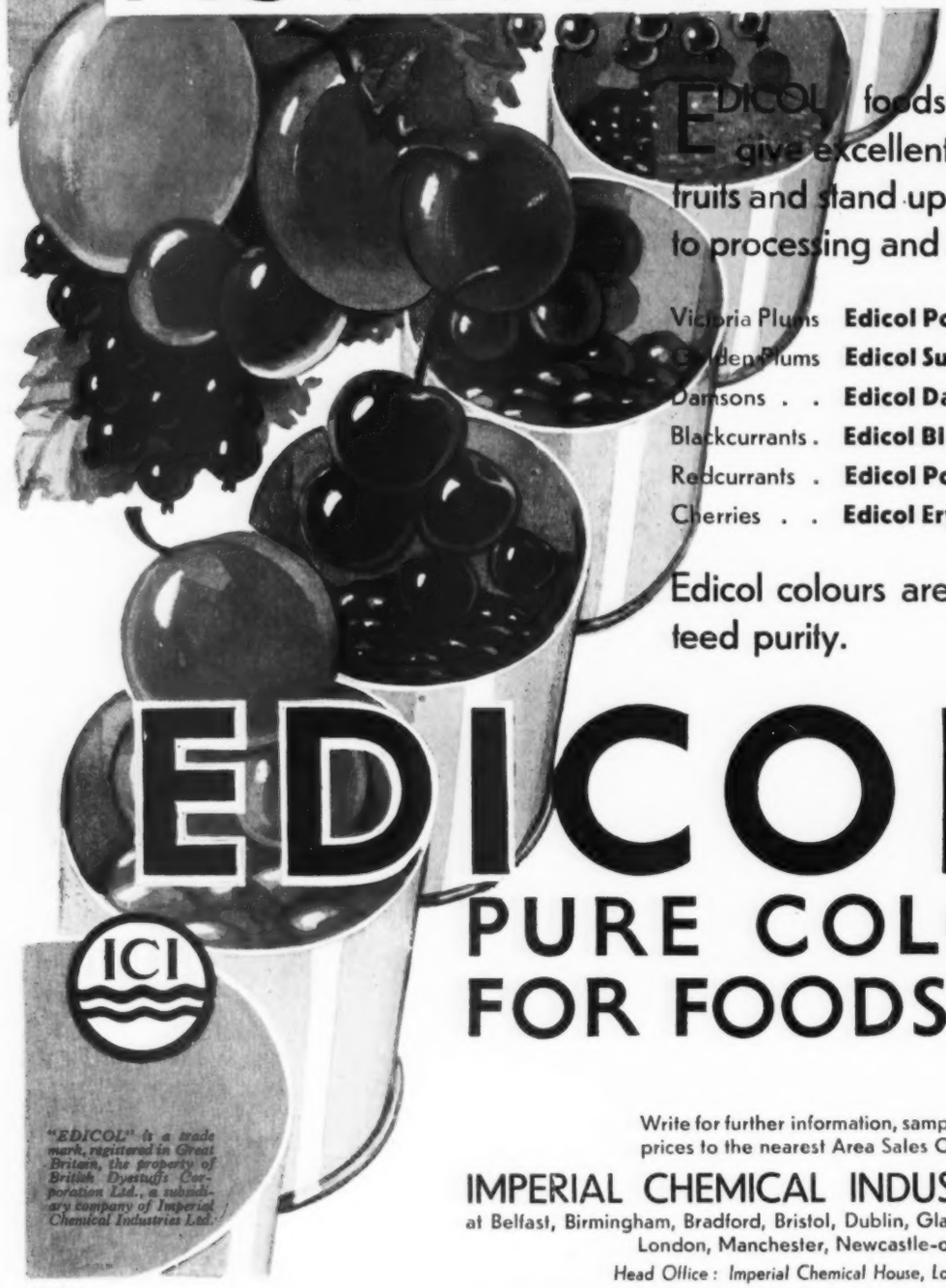

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# FOOD MANUFACTURE

Incorporating Canning, Packing and Preserving.

**Volume . . . IX**
**Number . . . 8**

AUGUST . . 1934

## CONTENTS

PAGE

THE EDITOR'S COMMENTS
*by Dr. H. B. Cronshaw, B.A., Ph.D., A.I.C.* 269

THE MANUFACTURE OF FRUIT JELLIES IN THE U.S.A. . . . . 273

FOOD MANUFACTURE IN AUSTRALIA
*by O. A. Mendelsohn, B.Sc., A.A.C.I., of Melbourne* . . . . . 277

THE MANUFACTURE OF CONTINENTAL SAUSAGES *by Peter Salomon, Diplom. Eng.* 281

ICE-CREAM CONTAMINATION
*by L. H. Lampitt, D.Sc., F.I.C.* . . 284

ENGLISH FRUIT CANNING . . . . . 285

BACON CURING *by E. H. Callow, Ph.D.* . . 289

PRESSURE IN CANS—PART III.
*by P. Chambellan, H. Cheftel, M. L. Thuillot, R. Boudeau* . . . . . 292

INDUSTRIAL NEWS . . . . . 295

INFORMATION AND ADVICE . . . . . 298

RECENT PATENTS . . . . . 302

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FOOD MANUFACTURE

Vol. IX, No. 8 August, 1934

## The Wheat Quota Again

**LAST MONTH** we referred to the attitude of the Scottish Association of Master Bakers to the wheat quota. Since writing, we notice that the National Association of Master Bakers have also taken the matter up. There is no question that the millers have passed the whole of the 4s. 6d. per sack of flour milled on to the bakers, who, however, have not been able to put the whole of the charge on to the price of bread. As the bakers have repeatedly pointed out, this was not such a serious matter when the quota was only 2s. 3d. per sack, but an imposition of 4s. 6d. per sack is a very severe charge for the bakers to pay. The National Association have now sent a letter to the Secretary of the Ministry of Agriculture and Fisheries protesting against the responsibility indirectly placed upon the baking industry of collecting the wheat quota. It was further suggested that the Government should make the wheat quota an Exchequer charge. The latter suggestion would appear to be the fairest way of dealing with the situation. If the Government have decided that agriculture is a national asset that must be preserved in spite of the lethargy of our farmers and the persistence in obsolete methods, by the payment of doles and subsidies, then it should do so out of the National Exchequer and face the music on Budget day. If it is a national affair it should be paid out of the national purse and not by increasing the price of the working-man's bread.

## The Act to Continue

In connection with the wheat quota there is a strong impression among many farmers that the Act will come to an end next year, and to ventilate the matter a question was asked in the House of Commons as to whether it was the intention of the Government to continue the quota after 1935. Mr. Elliot replied that the Wheat Act, 1932, provides that not later than March 1, 1935, the Minister shall appoint a Committee to review the standard prices. If that Committee makes a recommendation that the standard price shall be altered, the Minister may by the procedure of a Provisional Order revise the price with effect from August 1, 1935. He stated emphatically that there was no expressed intention of Parliament when the Wheat Act was passed, nor is there any intention on the part of the Government, to limit the operation of the Act to the period ending 1935.

## Wheat Advisory Committee

The meeting of the Wheat Advisory Committee that should have taken place in the last week in June had to be postponed because its sub-committee could not reach agreement on fresh proposals. This sub-committee was appointed in May following the refusal of Argentina to agree to the plan for minimum prices endorsed by all other members of the Advisory Committee. She demanded the right to exceed her export quota for the current year. The sub-committee has held frequent meetings, and the representatives of the principal exporting countries have been in constant communication with their home Governments, but it has been impossible to reconcile Argentina's demands with the views of the other exporters. While the negotiations are still proceeding the Argentine exports have already substantially exceeded the limitation figure to which her Government agreed last summer. So much for international agreements. More mere scraps of paper! Argentina's motto is evidently based on the North Country saying, "What's thine's mine and what's mine's my own." The main exporting countries are anxious to continue the agreement and are still seeking a compromise in direct discussions with the Argentine representatives; it is not likely that a full meeting of the Advisory Committee will take place until the result of these conversations is known. In the meantime the Argentine will go on flagrantly

breaking the agreement. We very much doubt whether any satisfactory arrangement will be arrived at and agree with the Political Correspondent of our contemporary, *Food Industries Weekly*, that "the whole situation is very complicated and no solution is at present in sight."

## Bread Staling

A patent, originating in France, which claims to preserve bread from "all variations of bacteriological origin," and to keep it in a condition of freshness for a long time, has been brought to our notice.

Essentially, the method suggested consists in mixing the dough with a hygroscopic substance, such as glycerin, glucose, or other sugars, magnesium chloride or other salts, baking it in a container with an incompletely sealed cover, then rapidly completing the sealing of the cover while the container is still hot, further heating the container after sealing and finally allowing it to cool slowly.

## Preserving Bread

Many cereal chemists and bakers feel the real need for keeping a faithful record of the texture and appearance of a loaf of bread. There have been many suggestions, such as making an impression with ink and also photography. Whilst the latter method is to a large extent satisfactory and serves as a means of reproducing bread points in printed articles and so on, there can be no doubt that on some occasions a preserved sample of the loaf itself would be far more suitable. This is especially the case in large bakeries and bakery instruction centres where it is desirable to preserve a specimen loaf for texture and grain. These factors rapidly alter on exposure to the air, and in order to avoid this a technique has been developed at the Minnesota Agricultural Experiment Station by M. C. Markley (*Cereal Chemistry*, vol. 11, p. 200). The method is to dip slices or half loaves in a solution composed of one part glycerin, two parts 40 per cent. formaldehyde, and one part water. The slices are allowed to soak up the solution to saturation, usually one to two minutes being required. They are then laid face side down on clean boards in a cabinet and allowed to dry slowly for about a month, after which time they will be ready for mounting. Too rapid drying must be avoided, as it causes the slices to crack. When properly prepared the slices are soft and will remain in that state indefinitely.

## N.R.A. Troubles

The difficulties of managing industry without introducing hardships are illustrated by a recent protest of the retail bakers, nominally against delay in completing the bakers' code. Actually they were complaining that they were caught between the provisions of the Agricultural Adjustment Administration and those of the N.R.A., for the blanket code of the latter was raising operating costs just when the A.A.A. processing taxes were curtailing the volume of business. These processing taxes have been levied on wheat and sugar in order to help the farmers, and as a consequence the bakers have had to raise their prices, and business has fallen off. They therefore feel that they cannot support the imposition, by the hours and wages provisions of the N.R.A. code, of fresh additions to costs.

## Baking Powder Faults

Before the Food and Cereal Section of the Canadian Chemical Association's recent Toronto meeting, Miss A. C. Willard and Miss H. M. Newton read a paper on "The Formation of Dark Spots in Baking Powder Products" (*Can. Chem. Met.*, 1934, p. 131). Hitherto this defect on products, in which baking powder has been used, has been associated with the soda present in the powder reacting with certain pigments in the flour. The present investigation has shown this not to be the case, but to be due to the acid constituent of the powder dextrinising, or even carbonising, some of the carbohydrate, and this is accounted for by the concentration of acid at the particular points where the dark spots are formed. Most reactive in this respect is monocalcium phosphate, and this might possibly be attributed to its rather insoluble nature, and to the fact that on hydrolysis it gives phosphoric acid ($p$H 1·96), which is stronger therefore than tartaric acid ($p$H about 3·0).

The formation of dark specks can be overcome largely by more thorough incorporation of the baking powder by kneading, and allowing to stand when possible.

## Sixty Years of Margarine

The diamond jubilee of the manufacture of margarine was recently celebrated at the Purfleet margarine works of Messrs. Van den Bergh and Jurgens, when a tablet to the inventor, M. Mège Mouriés, was unveiled by the great grandsons of the first manufacturers, Mr. J. P. Van den Bergh and Mr. Franz Jurgens. The story of the inven-

tion of margarine is a romance of industry and two families. When the Germans were advancing on Paris during the Franco-Prussian War the supply of foods in the capital became more and more difficult. Napoleon III offered a prize for the discovery "of an article as nutritious, as stable and as palatable as butter." Mouriés after much experimenting discovered that milk and butter originated from the actual fat in the body of the cow, and he succeeded in producing from animal fat a product which, though very different from the margarine of to-day, was its forerunner, and won the prize. Mr. Jurgens went to Paris to learn how to make the new product, and started its production at Oss in Holland. Later Mr. Van den Bergh, who was a butter merchant, erected a small plant and sent his eldest son to England, where he started importing margarine. It is now sixty years since the first commercial shipments of margarine arrived in this country. For many years the Dutch made the best margarine, but in recent years all the home requirements have been manufactured in England. Nowadays margarine is made from a large variety of refined vegetable oils.

## Margarine in Trouble

Many of the failings of margarine are obvious and have been well ventilated, but we have never come across such a sweeping indictment as the report by Professor L. Hugounenq to the French Academy of Medicine recently. He stated that its faults include a comparative lack of digestibility, a deficiency or absence of vitamins and of the acids which give butter its attractive smell and taste. In addition, he pointed out that butter contains phosphorus, which is not found in the materials from which margarine is made. As a result of this report a very strong resolution was adopted. The Academy considered that certain margarines provoke digestive troubles that are undoubtedly due to faulty conditions of manufacture and purification. They believe that certain factories elude the supervision and control provided by the law, and the resolution adopted was that all undertakings, without distinction, which deal with animal fats intended for food should be under supervision and inspection and subject to full legal control in the interests of public health.

## Boost

We occasionally come across examples of the "boost" that is so frequently found in the States, but an article in a recent issue of a well-known periodical devoted to the milling industry in America takes first prize. It is an interview with a scientific gentleman having an Italian name who is described as "the man whom millers employ to ferret out lurking profits." His laboratories in Chicago reminded the interviewer "of a fanciful conception of a chemist's heaven such as is depicted in the movies." This chemical god in his Elysian laboratory deals with the cereal and milling trades, but nothing so common as milling, as we know it, for him; his "artistry is confined to commerce, his magic to vegetable life and minerals, his sleuthing to finding new derivatives or combinations of ingredients that lure floods of consumers' dollars to his clients' coffers." This magician has converted wheat into glutamic acid —the flavouring matter of meat. In fact, he says he gets a powder that tastes more like meat than meat! Then he mixes this with flour, adds dried vegetables and gets a highly concentrated beef broth that has never seen beef! One of his masterpieces is to convert wheat into coffee! "Not the kind of goo-oo you're thinking of—but a highly palatable extract that tastes like high-grade coffee." This, he says, sells by the truck load. He even invented pellets for feeding fishes—they can be made of anything provided coriander seed is included—the fishes can't resist this. And from soya beans he has made a food drink—a compound of soya bean extract, malt sugar, and chocolate flavour!

We were almost impressed by this marvel of science until in the same journal we found a two-page advertisement (do gods in heavenly laboratories need a boost?) which ended, "Your communication will be treated in strictest confidence. And it will give us the opportunity of telling you exactly what we have invented, discovered, and devised for other mills." So much for the confidence of the other mills!

## Grapefruit

The Bureau of Chemistry and Soils, U.S. Department of Agriculture, Washington, has recently been interesting itself in grapefruit investigations. Nelson and Mottern have found that Florida grapefruit peel oil, prepared by pressing the peel between rolls and centrifuging, contains about 90 per cent. limonene, 2 to 3 per cent. oxygenated volatile constituents and sesquiterpenes, and 7 to 8 per cent. waxy materials.

At a recent meeting of the American Chemical Society it was stated that canners use 100,000 tons

of grapefruit annually, which would yield 50,000 lb. of oils as by-products from the rind.

H. D. Poore has investigated the recovery of pectin and naringin from grapefruit residues consisting chiefly of peel, membrane, and seeds. This contains 3 to 4½ per cent. of pectin and about 0·75 per cent. of naringin. Poore describes in *Ind. and Eng. Chem.*, June, 1934, p. 637, methods for the recovery of these products from the residues.

## Naringin

This substance was discovered in 1857 in the flowers of grapefruit trees in Java. It constitutes the bitter principle of grapefruit; so bitter is naringin that its taste can be detected when 1 part is dissolved in 50,000 parts of water. It is a lemon-yellow crystalline glucoside that may possibly have therapeutic value or serve as the basis for the manufacture of other compounds. It is soluble in alcohol, acetone, and hot water, but only to the extent of about 1 part in 2,000 in water at 20° C.

## Insecticides—Danger to Bees

According to the *Technische Blätter*, arsenical insecticides in powder form are extremely dangerous to bees, although when applied by injection they have never been shown to be toxic towards the swarms. It has been difficult to obtain information from which definite inferences could be drawn in respect of insecticides based on copper and iron. Copper preparations in powder form have not been shown to be harmful when applied, according to the instructions, on leaves already moist with dew, and the same applies to iron sulphate preparations.

Materials such as sugar, molasses, and honey, designed to attract the insects, should be avoided, as they would attract the bees as well.

## Cheese Cakes

A little while ago a firm was prosecuted for selling cheese biscuits in which margarine cheese was used, the prosecution holding that if cheese biscuits are sold they must contain normal quality cheese. Margarine cheese is prepared by substituting the natural butter fat of milk by some other fat, and we understand that it is illegal to sell it as ordinary cheese. This opens up rather a wide field, and, if the law is going to be consistent, considerable bother is looming in front of the bakery trade. No one ever puts wine into wine biscuits or brandy into brandy snaps—yet on the argument of the cheese cake prosecution one ought to. A humorist at the Llandudno Conference of the National Association suggested that bits of Messrs. Ramsay MacDonald and J. H. Thomas would have to be included in cabinet pudding! In Scotland, cheese cakes contain no cheese at all, and, if the law is to be enforced strictly, these delicious cakes will have to be renamed. In America and Germany the cheese cakes do contain a considerable amount of cheese. In one recipe we have seen there is 5 lb. of cheese, 2½ lb. of eggs, 1½ lb. of milk to 10 oz. of flour! These doubtless require an American or German digestion to be dealt with adequately.

## Tinplate Corrosion

With the aim of overcoming the corrosion of tinplate, the importance of investigating the electrochemical relations of tin and iron in different liquid media has long been recognised, but interpretation of the work done in the past has been rendered difficult by the peculiar reversal of potential which occurs under certain conditions. Thus, tin is sometimes anodic and sometimes cathodic to iron.

The mechanism of these changes is more clearly understood as a result of recently published research carried out on behalf of the International Tin Research and Development Council by Dr. T. P. Hoar at Cambridge University. The work described has a direct bearing on the corrosion of tinplate cans by fruit juices, etc., and indicates promising lines for future work aiming at reducing the corrosion of tinplate.

The results of this important work, to which reference was made in these columns last month, have recently been published in *Technical Publication* No. 5, issued by the International Tin Research and Development Council.

## Beetles

The Forest Products Research Laboratory at Princes Risborough is carrying out useful work on wood-destroying beetles and fungi, including dry rot. We have been asked on several occasions for advice on the ways and means of dealing with the common furniture beetle (*Arobium punctatum*). The Laboratory is studying the life history of this pest, and should be in a position to give useful help to anyone who does not care to follow the advice of one authority who said the only way was to burn the furniture. As a matter of fact, the Laboratory has already published a Research Leaflet (No. 8) on the common furniture beetle, which may be obtained free of cost.

# THE MANUFACTURE OF FRUIT JELLIES IN THE U.S.A.

THE COMMERCIAL manufacture of fruit jellies forms an important branch of the preserving industry in the U.S.A. There is no doubt that the quantity of jelly manufactured in that country bears a higher ratio to the amount of jam manufactured than is the case in England. The principal reason for this favourable showing on the part of jelly is probably to be found in the use of glass as a container for jelly in the U.S.A. Glass affords an ideal medium for the display of a pure fruit jelly, particularly if steps are taken to ensure a brilliantly clear product. Furthermore, due to the widespread use of a "tumbler" package for jelly, a container is provided from which the jelly is easily removed, and retains its shape on removal, forming a ready-made moulded jelly for table use. Jellies are offered in greater variety in the U.S.A. than in England, which may also account for their wider distribution. Grape, cranberry, raspberry, strawberry, apple, mint, quince, currant, and other varieties are all available. The most popular jellies are rather different from any jellies produced in England, and are in general prepared by different methods, but there seems to be no reason why many varieties of fruit available in England should not be marketed as jellies packaged in glass jars.

A description of the procedure used in the manufacture of grape jelly will illustrate the methods used in the U.S.A., and serve to indicate points of difference compared with procedure in England.

### Grape Jellies

Grape jelly is manufactured from a special variety of grape known as the "Concord". This type of grape is not very suitable for wine making purposes, but possesses a rich purple colour and a strong characteristic flavour. The manufacture of grape juice for jelly making is quite an interesting process. In the first place, the grapes used are not highly endowed with pectin, and it is therefore not possible to allow them to ripen to the stage of maximum flavour, but rather they must be used while the pectin content is still sufficiently high. Some manufacturers solve this problem by making two extractions—one from grapes which have ripened to develop the optimum flavour, and another from grapes which are relatively unripe and higher in pectin, the two extractions being combined to give the desired flavour and pectin strength.

The colour of the grape juice is adversely affected by iron and copper, and therefore nickel or aluminium equipment is widely used. As the grapes have rather thick skins and large "pips", they are lightly crushed to free the fruit before extraction of the juice. The crushed fruit is usually passed through a perforated cylinder which does not permit the passage of the stems. There is a noticeable improvement in the flavour of the juice made from the stemmed grapes, due presumably to the absence of tannin materials extracted from the stems.

The fruit is usually mixed with a small amount of water and heated to a comparatively low temperature—sometimes only 150°, but usually up to 180°—for a few minutes and then delivered to tanks which supply the fruit presses. A higher temperature of extraction will result in loss of flavour and colour, but is sometimes resorted to if the grapes are deficient in pectin. The juice is usually extracted from the pulped fruit in a screw

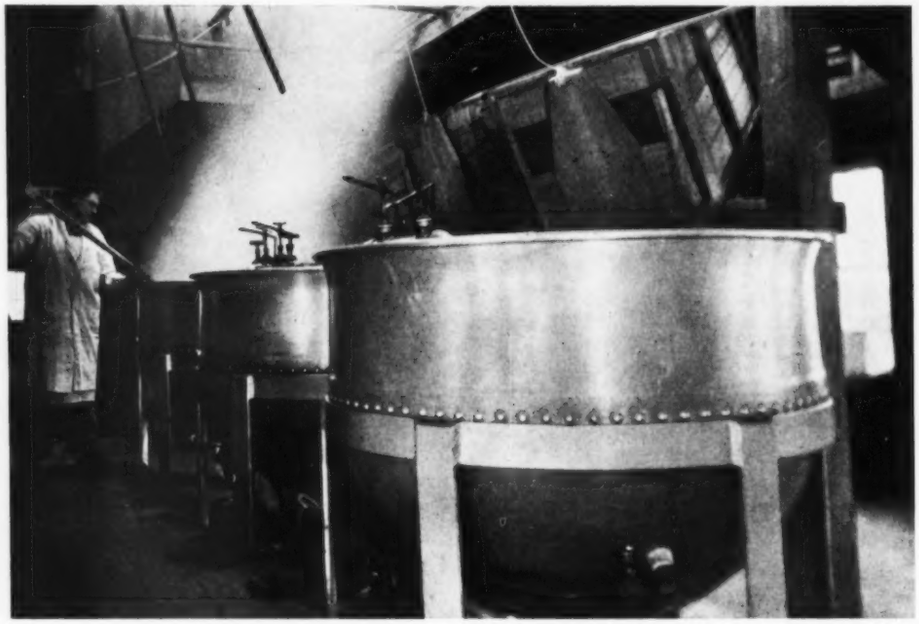
press, the pulp being placed in cloths stretched on racks, the "cheeses" thus formed being stacked in the press, and the juice squeezed out through the cloth, leaving a residue of skins, seed, and fibre. The quantity of insoluble solids in the juice can be regulated to some extent by the porosity of the cloth and the pressure applied. Presses of this type give a surprisingly high yield of juice, and are particularly adaptable where the high proportion of skin and other insoluble solids renders a plate and frame press impracticable, due to the rapid clogging of the cloths. The expressed grape juice is then reheated to 160° to 170° F. for pasteurisation, sometimes in open kettles but preferably in tube pasteurisers, and is ready for storage.

Freshly extracted grape juice contains excessive amounts of "argol" or potassium bitartrate. Jelly made from freshly prepared juice invariably develops crystals of bitartrate on standing, giving an objectionable sandy or gritty jelly; nevertheless, some manufacturers claim that removal of the bitartrate also removes some of the flavour, and they prefer to risk complaints regarding crystals in the jelly—which very often are mistaken for small pieces of broken glass. Usually, however, the juice is run into 5-gal. glass bottles, which are corked and paraffined and stored in a cool place for three months or more.* During this period the crystals of bitartrate gradually deposit on the bottom of the bottle, and when ready for use the supernatant juice is siphoned off and used for the jelly. Generally this juice is not filtered bright before use, as this detracts from the colour and flavour of the jelly.

It is an interesting sight to see the grape juice storage of a large manufacturer with thousands of bottles or carboys of juice in stock; the breakage on this glass is surprisingly low, and the bottles can be used over and over again. Bottles specially made for the purpose must be used and they must, of course, be carefully handled and preheated with warm water before filling in the hot juice. Recent improvements in the manufacture of the glass have led manufacturers of tomato pulp to try glass instead of tin, as the reuse possibilities of the glass make it cheaper than tin. Tin, even enamelled, cannot be used for grape juice, as it destroys the colour. The most modern method for handling the juice is to run it direct from the pasteuriser into barrels which are stored at temperatures of 28° F. or lower, in order to freeze the juice, thereby accelerating the deposition of crystals. The frozen juice is then thawed out and strained to remove sediment before use in the jelly. Glass-lined tanks are also employed for the cold storage of the juice, and this method is probably the most sanitary and effective.

In the actual manufacture of the jelly, equal parts of juice and sugar are used. By definition of the Food and Drugs Administration, pure fruit jelly consists of semi-solid gelatinous product made by concentrating to a suitable consistency the strained juice or strained water extract from fresh fruit, from cold packed fruit, from canned fruit or all of these, with sugar or with sugar and dextrose. According to the standards of the National Preservers' Association not less than 50 lb. of fruit, or its equivalent in juice, are to be used with each 50 lb. of sugar in the preparation of the jelly, and the product must be concentrated to a total solids content of not less than 65 per cent. This standard is that generally adopted by commercial manufacturers. The end point of the boiling is usually determined by thermometer readings, sometimes backed up by Abbé refractometer readings of the total solids. With a total solid content of only 65 per cent. it can be seen that the jelly is boiled to a lower concentration than most English jellies, but as a hermetic cap is used there is no risk of spoilage, and with a hermetic cap a more delicate and tender jelly can be made than is possible with an open jar covered with parchment or the like. The jelly is usually boiled in aluminium, tin-lined, or copper kettles, and is fed by gravity into the hopper of the filling machine, where it is filled into the final containers.

Glass jars of the tumbler shape are usually employed, holding 6 to 8 oz. of jelly; recently, so-called cocktail



(*Courtesy, Cranberry Canners, Inc.*)

**Aluminium Kettles for Cooking 500 gallons of Jelly.**

* Recently two-piece hermetic screw caps have been found very suitable for sealing these jars.

glasses have been popular, using a thin glass with a beaded rim which can be used as a drinking glass after the jelly is removed. The jelly is invariably hermetically sealed with one of the many types of caps available in the U.S.A. for this purpose; sometimes the jelly is given a short pasteurisation at 180° F. in the package, followed by cooling, or it may be cooled immediately after sealing. Larger jars of jelly are also popular, holding up to as much as 4 lb. Jelly is also sold in cans, using the standard No. 10 can, holding 8 lb. of jelly. This size is taken mostly by hotels and restaurants. There is also some volume of jelly handled in pails, made of paraffined wood, holding 30 to 40 lb. of jelly, or in barrels holding up to 500 lb. These larger packages are used mostly by bakers who wish to obtain a distinctive jelly for jelly rolls and other confections.

A small amount of tartaric or citric acid is sometimes added to some varieties of grapes in order to produce the optimum flavour in the jelly. It is preferable to make the juice for grape jelly direct from the grapes as they are harvested, the grapes for juice being often grown on contract for the manufacturer; juice can also be made from frozen grapes, the grapes being frozen at 16° F. direct in the baskets in which they are harvested. However, when using frozen grapes it is still necessary to store the juice to permit separation of the argols, and in general the juice is expressed from the freshly harvested grapes, and stored until ready for use.

(*Courtesy, International Nickel Co.*)

**Monel Metal Pulping Machine for Cranberries.**

## Cranberry Jelly

Another typical American jelly is cranberry jelly, or cranberry sauce as it is sometimes called. This product, as a matter of fact, does not come within the definition of a true fruit jelly at all, as in its preparation only about 1 lb. of fruit is used to 1½ lb. of sugar. Furthermore, the finished product only contains 40 to 50 per cent. of soluble solids. Cranberries are hard red fruits, spherical in shape, about the size of a large acorn, and are cultivated in bogland in New England and New Jersey. They have a tart characteristic flavour and the jelly is a deep red colour, which is most attractive. Cranberry jelly, or sauce, would probably be very popular in England, where the public taste is for acid, strongly flavoured products. The jelly is usually made direct from the fresh fruit, and is in reality more like a smooth jam, the fruit being first pulped with a little water, then run through a pulping machine with a fine screen, as used for tomato products. The resulting juice is boiled with sugar either to a definite jelling point or to a definite solids concentration as measured by an Abbé refractometer. Vacuum pans may be used for making the jelly, but smaller batches are preferred, due to the quick-setting nature of the product.

(*Courtesy, Cranberry Canners, Inc.*)

**Filling Machine for Jelly.**

## Apple Jelly

Another jelly which has a surprisingly wide sale is apple jelly—presumably chiefly popular on account of its low cost. Apple jelly is made from fresh apples, the juice being expressed on a cider press and often clarified with filter aid of some kind before use. It has usually a brownish tinge and a mild flavour—apples in the U.S.A. are generally lower in acid than the English juice apples, and the jelly correspondingly low in acid. In fact, in view of the mild flavour of the jelly it is quite surprising that its sale is so extensive.

## Mint Jelly

Mint jelly is another well-known type. This is used with lamb and as a garnish for salads, and presents a

very handsome appearance. It is coloured a bright green, using brilliant blue and tartrazine to get the required shade, the label of course stating that colour has been used. The mint flavour is generally of the spearmint type, and it must be confessed that the flavour does not generally live up to the appearance. However, the better manufacturers achieve a more desirable flavour by using a proportion of vinegar in making the jelly and blending spearmint and peppermint to obtain the flavour. Mint jelly may be made using an apple juice as a base, but is usually made from pectin, either liquid or powdered.

### Strawberry, Raspberry and Blackberry Jellies

Jellies are also made from strawberry, raspberry, and blackberry. The usual method is to boil the fruit with the addition of 20 to 25 per cent. of water, and then express the juice in a screw press or cider press, clarifying with filter aid if a clear jelly is required. The resulting juice is concentrated to the required degree in jacketed kettles, large batches up to 300 lb. being frequently employed. The finished jelly is filled by machine into the jars or other containers, which are handled as for grape.

### Redcurrant and Blackcurrant Jellies

Redcurrant or blackcurrant jellies are not widely manufactured in the U.S.A. as such; currant jelly is made to a certain extent, and is prepared from red currants somewhat deficient in flavour and colour compared with European varieties. Currant jelly is sold as a rather cloudy jelly with a strong flavour, or as a very clear bright red jelly with a mild flavour. It does not enjoy the popularity which redcurrant and blackcurrant jellies experience in England, possibly due to the fact that most jellies in the U.S.A. are used as spreads for bread or crackers, and the American prefers a sweet mild jelly for this purpose, such as grape, strawberry, or raspberry. Cranberry is an exception; this is served with turkey at the traditional Thanksgiving or Christmas festivities. Mint jelly is served with meat where currant jelly is served in England.

### Imitation Jellies

A surprisingly large amount of "imitation jelly" is made in the U.S.A. The ingredients employed are pectin, acid, sugar, colour and flavouring material. Cherry, strawberry, and raspberry are the most popular flavouring, the jelly being largely distributed in bulk to bakers, and used in jelly rolls (similar to jam rolls in England). The low cost of this type of jelly is the only point in its favour, as the synthetic flavour is usually very pronounced. However, as the public taste improves a demand is growing for pure fruit jellies for this purpose, and in this way the jelly manufacturer will have another outlet in addition to the already established demand for glass-packed jellies.

*(Courtesy, International Nickel Co.)*

**Nickel Steam-jacketed Kettles for Cooking Jelly.**

# FOOD MANUFACTURE IN AUSTRALIA

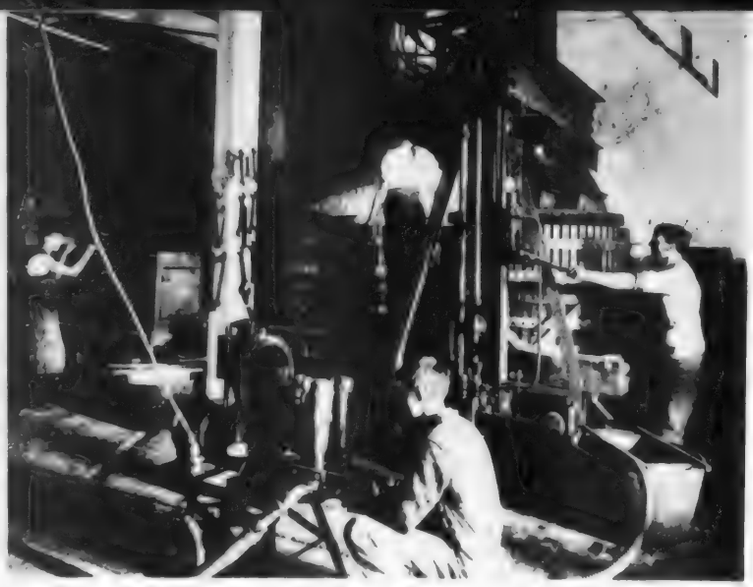
By O. A. Mendelsohn, B.Sc., A.A.C.I.
of Melbourne

THE TYPICAL Australian is usually pictured as a man born and reared in the saddle, spending his life in the wide open spaces far from a metropolis and eating the fresh fruit of the farms—in short, a rural fellow. Actually more than 70 per cent. of Australians are city dwellers, and the typical Australian lives under conditions not very different from those of the urban populations of Europe and America. The drift to the cities has been steadily proceeding for the last half-century, and in consequence of this movement there has been a marked increase in the proportion of packed preserved foodstuffs consumed. Furthermore, as in other countries, there is a growing tendency for the housewife to demand more leisure, and in spite of depressed conditions there is each year an increase in the proportion and variety of packed foodstuffs consumed. The present generation, therefore, has experienced a change from the limited consumption of imported canned foodstuffs to a considerable local and export trade in foodstuffs packed in Australia in both tinplate and glass.

While grave doubts exist concerning many of the economic consequences of Australia's high tariff policy, it is generally believed that under wartime conditions and during the disastrous fall in the prices of primary products of the past few years, it was greatly to her advantage that this high tariff policy resulted in the establishment of many secondary industries. This policy, therefore, is not likely to be seriously modified in the future. It has, of course, stimulated the growth of the urban population, and it has fostered the industries concerned with the preserving and packing of foodstuffs. There is still a large quantity of canned herrings, salmon, sardines, and sweet corn imported, but most of the other preserved foodstuffs are now packed in Australia in quantities sufficient to meet the local demand, and in many cases a large export trade has been developed. The quantity of glass-packed goods imported is now small and diminishing.

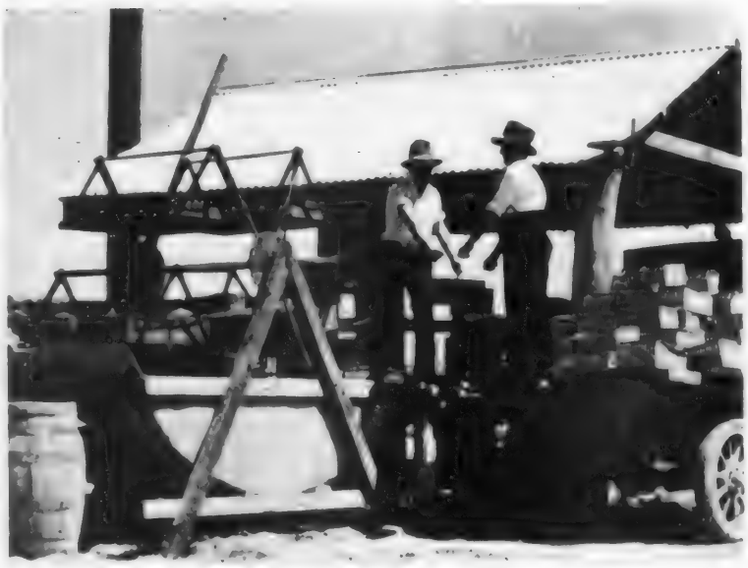
The sale of Australian glass-packed goods is continually increasing, partly because of attractive appearance, and partly because strenuous efforts are being made by the industries concerned to popularise consumption. Most foodstuffs which have in past years attained popularity packed in tinplate can now be obtained packed in glass. In many cases canned and glass-packed goods do not compete with each other owing to the disparity in price and appearance, but where competition exists the usefulness of the glass container after the contents have been removed gives this article a marked advantage. Excluding glass bottles for beverages, sauces, pickles and preserves, the quantity of new glass containers taken into use for packing foodstuffs is about 20,000 gross per annum. The actual quantity packed is, of course, considerably greater because a proportion of the containers is used over and over again, particularly in the case of foodstuffs packed in homes and farms. It is difficult to

**Bagging Milk Sugar at a Butter Factory in Victoria.**



ABOVE: **Making Cider—Hobart.**

MIDDLE: **Dipping Australian Sultanas.**



BELOW: **Egg Pulping—cracking and final inspection. A 45 lb. block of Frozen Egg Pulp sawn in half to demonstrate the quality and thorough freezing, is shown in the middle of the page opposite.**

estimate the quantity of domestic food packing, but it probably accounts for between 10 and 20 per cent. of the total. It is mainly confined to fruit and vegetable products such as jams, jellies, sauces, and pickles. It is interesting to reflect that the food preserving industry originated in the bottling of fruit and vegetable preserves on farms, and later developed on mass production lines in large factories to feed the huge modern urban populations. The factory-made packs have been so improved in nutritive value and appearance that appreciable quantities are now being consumed in country homes. This is also partly due to the fact that in Australia primary production has become highly specialised, as in other agricultural countries. Large areas in Australia are exclusively devoted to the production of wool, others to wheat, others again to fat cattle, dairy produce and various types of fruit respectively. There is certainly some mixed farming, but the proportion is small, and most of Australia's rural workers are just as dependent for the bulk of their food supplies as the city dweller. Most dairy farmers have even ceased to make butter, using only factory butter, and the tendency is for the food supply in rural homes to resemble that of the cities.

## Fruits

The earliest attempts at canning in Australia were concerned with meat, and this in a crude way, but in the early stages it never attained very large dimensions. The modern high-grade canning industry commenced with fruits, on the lines of the Californian packs, and this is still the largest canning activity in Australia. Canned pears, peaches, and apricots in Victoria and New South Wales, and pineapples in Queensland are the chief outlets, with a certain amount of packing of berry fruits in Tasmania. Other staple lines are jams, tomato sauce, chutneys, and pickles. About 90 per cent. of the jam and preserved fruits are still being packed in cans, and there is scope for expansion of the glass-packing industry in this direction. Additional fruit product lines are being developed, and some are expanding rapidly. When the tomato crop is harvested a small proportion is used for the manufacture of tomato juice packed in glass. Most of the crop, however, is packed in bulk in the form of tomato pulp in cans for transport to factories, where it is used for the manufacture of condiments packed in glass. The *per capita* consumption of tomato sauce in Australia is exceedingly large. Although preserved fruits are mainly packed in cans, there is a growing trade in certain fruit delicacies, such as salads and passion fruit, which are invariably packed in glass. The production of passion fruit is very well suited to Australian conditions, and although there has been a popular demand for this delicious fruit in the fresh condition, its possibilities have not until recently been generally recognised by the packing trade, and there are good prospects for the development of a substantial export trade. There are certain fruits which cannot satisfactorily be packed in cans, and these are now being sterilised, cooked ready for use, and packed in 7-lb. glass jars.

## Meat Products

Canned beef and tongues were at one time packed in tins in large quantities, particularly during the war years, but in face of strong competition from New Zealand and the Argentine this industry languished. There is now a revival of the trade in meat products, tongue, ham, and paste in glass. Markets for preserved meats are being developed in adjacent Oriental countries. Attention is being given to the packing of chicken and rabbit, and the industry is now growing. Many years ago the first live rabbits were brought from England by a well-meaning sportsman, but these animals found the country so much to their liking that they developed into a national pest, and this may be the reason for the strong prejudice which exists among many Australians against rabbit as a foodstuff, and which militates against the development of a local trade. Large numbers of frozen rabbits are exported, and there is some reason to believe that an export trade in packed rabbit could be developed.

## Fish Products

There are much greater difficulties in the way of developing a large fish preserving industry in Australia. Apart from the usual marketing and factory problems, fish do not shoal in Australian waters, and the cost of collecting fresh fish is therefore much greater than elsewhere. On the whole, Australians consume comparatively little fish, and are evidently fastidious, because, of the large variety of edible fish available, only a few find general favour, and the price of fresh fish has been excessively high. There is no permanent organised trawling industry, and it does not seem likely that the consumption per head is likely to increase in the near future. However, the beginning has been made by several firms in the production of fish and fish pastes packed in glass containers. Crayfish (lobster) is also being packed.

Australia consumes large quantities of sweets per head, and for the most part these are manufactured and packed locally. Several large and efficient confectionery factories have been established and are prospering. Many of the lines, such as chocolates, sugar candy, and nuts, are being attractively packed in glass.

There is always a demand for numerous speciality lines which require neat packing and attractive labelling, and these are pre-eminently suited to glass containers. Cheese products, fish pastes, sandwich relishes, yeast extract, meat extract, nut products, fruit products, fondants, and malt extract are examples of this large class of foodstuff. While the sale of each line may be small, in the bulk this trade has assumed respectable proportions. Mayonnaise and salad dressing are beginning to show signs of the popularity which they enjoy in U.S.A., and as in that country, the trade in Australia is likely to expand rapidly unless it meets effective opposition from the well-entrenched dairy industry with which it competes. The baking industry is not at present a large user of glass packages. Biscuits and cakes are mainly distributed in tins, except for a small proportion packed for display purposes in large glass jars. However, steamed puddings, hitherto packed in cans, are now appearing in sealed glass jars, and should find a ready sale.

There is very little trade in packed vegetables. Practically no home market exists owing to the abundance everywhere of fresh vegetables, but there is a small trade in the choicer vegetables such as asparagus, of which a small proportion is packed in glass containers. There are, of course, large quantities of pickles consumed locally, and these are all packed in glass bottles and jars. The most popular varieties are onion, green tomato, mixed pickles, gherkins, and olives.

## Dairy, Confectionery and Other Products

The distribution of milk and table cream in glass bottles—half-pint, pint, and quart—is rapidly increasing, and, aided by up-to-date bottle washing and filling machinery, is likely to supersede completely the old-fashioned methods. Manufactured milk products, such as powdered and condensed milks, in which there is a considerable export trade, are of course packed in cans, and there is a small trade in sterilised cream in glass jars. This is homogenised (visolised), and many Australians, even in country districts, prefer it to fresh cream for some curious reason. Bulk honey is packed in large cans, but for retail trade it is repacked in glass jars.

Picking Currants at Mildura, Victoria.

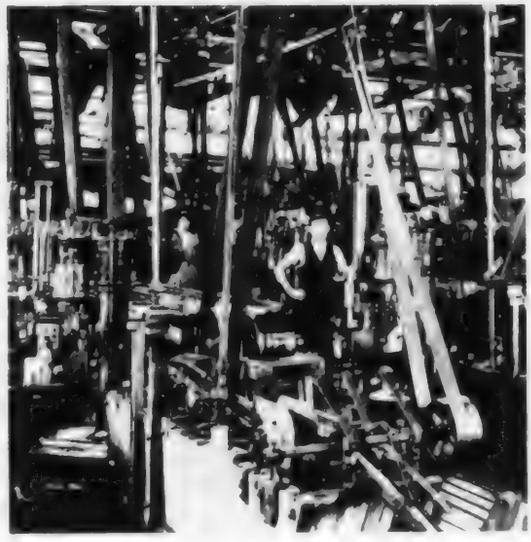
## Packing in Glass

The whole of the glass containers used for packing foods in Australia are produced locally. This industry is highly organised, efficient, and well entrenched behind tariff protection. Caps, seals, and capping and sealing machinery are also made in Australia. There is no necessity to enlarge on the technology of the industry here. General methods of preparation, processing, and sealing are modern, and follow the well-tried systems developed in U.S.A. and Europe. Glass jars and equipment for domestic food packing in homes and farms are made locally.

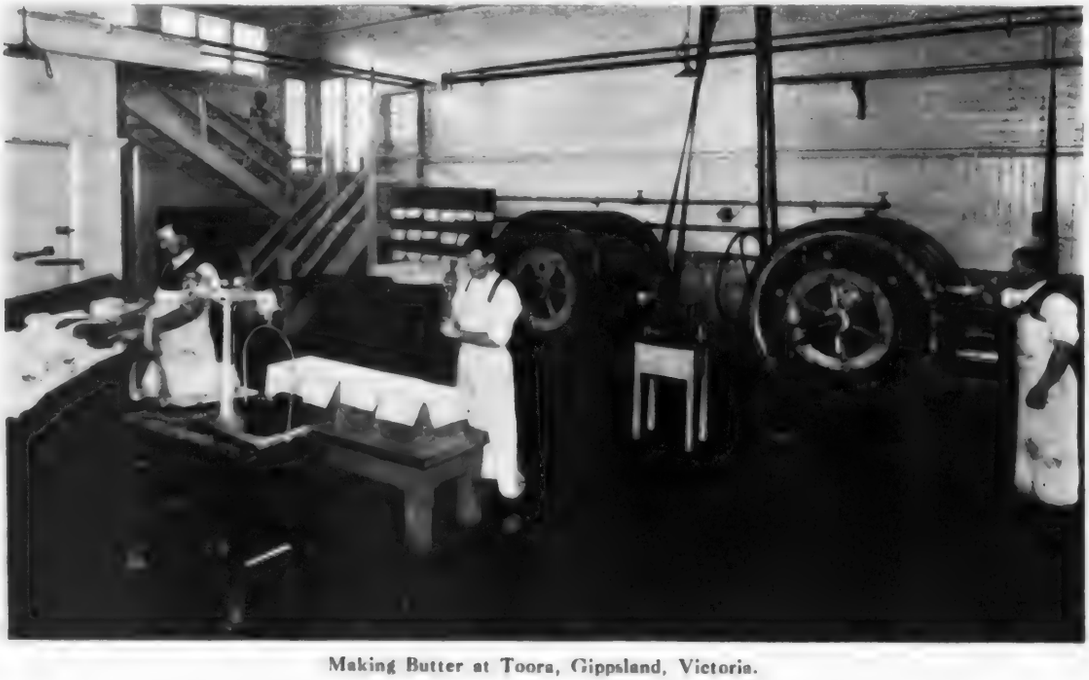
With the exception of standard lines such as Mason and other glass jars for home preserving, one enterprising concern has obtained a virtual monopoly of home canning outfits and has made comparatively vast sales. The outfit consists of a supply of jars (mainly straight-sides with clips), a small tinplated boiler, together with thermometer, etc. Sealing is by metal lids exhausted by simple heat treatment, the jars being temporarily clipped. The outfit is attractively packed, aided by clever and extensive advertising and a comprehensive book of instructions. The sales have accounted for a large growth in the home packing industry. Some housewives even use the outfit for the preserving of vegetable and meat products, but the risk of food poisoning entails great care, and the lessons from the recent American outbreaks will, no doubt, be learnt.

It is a characteristic feature of modern trade that instead of, or in addition to, the competition which has always existed between firms in the same industry, whole industries are now competing one with the other. The packing industry as a whole competes to some extent with the fresh food industry, and there is, of course, intense competition between the glass packing and the canning industries. Although great improvements have been made in the utilisation of tinplate and synthetic containers, glass is undoubtedly the ideal container for foodstuffs, the disadvantages being cost, weight, and fragility, of which the most important is the price factor.

The high standard of living in Australia, and the greater fastidiousness shown by the Australian consumer, are facilitating the steady progress of the glass-packing industry. With the recovery in economic conditions there is no doubt that this progress will be greatly accelerated.



A Jam Factory at Hobart.



Making Butter at Toora, Gippsland, Victoria.

# The Manufacture of Continental Sausages

By PETER SALOMON, Diplom. Eng.

## Raw Sausages and Cold Smoking Treatments

THE VARIOUS brands of raw sausages exhibit more marked differences among themselves than do the various types of scaldings. They may be classified as follows:

"Cooked" Sausage.
Soft Sausage or Spread Sausage.
Dry Sausage or "Dauer" Sausage.

Strictly speaking, cooked sausages do not belong to the category of raw sausages, but as cold smoking is employed in their preparation they may be included here.

It is important to know that the countries mainly consuming Continental sausages do not use frozen or chilled meat, and therefore the sausages are made from fresh meat.

## Cooked Sausages

The cooked sausages include:

Blood Sausage.
Liver Sausage.
Meat Sausage.

The filling of the cooked sausages is prepared in the bowl chopper and in the mincer. As a rule, on the Continent, no cereals at all are used for their preparation.

In contrast to the scaldings, the cooked sausages have to be first cooked before being treated in the smoke stove.

The cooking process consists of two stages, the first of which has to be carried out in boiling water and lasts for about ten minutes. After this the sausages remain in the water for another hour, during which the water must have a lower temperature, depending on the raw materials used, and which averages about 180° F. (82° C.). During this second stage a slight coloration takes place.

The cooking process is best carried out in steam-jacketed boiling pans, which should be heated by steam at constant pressure, thus enabling the correct temperature to be maintained during the second stage of the cooking process. The pan should contain a sufficient quantity of water, which must be stirred occasionally because the water is always warmer in the neighbourhood of the lining than in the centre of the pan.

Since the sausages are lighter than water they have to be kept under the water-level by a grid in order to ensure that they are completely cooked (Fig. 1).

In connection with this process a very thorough cooling in a bath of running water is necessary; the water should be kept as cool as possible (Fig. 5). After a period of drying in the air, which then follows, the sausages are ready for the cold smoking process.

FIG. 1.—Sausages floating on the water while cooking. Note grid for holding them under the surface.

FIG. 2.—Rocking Choppers in use.

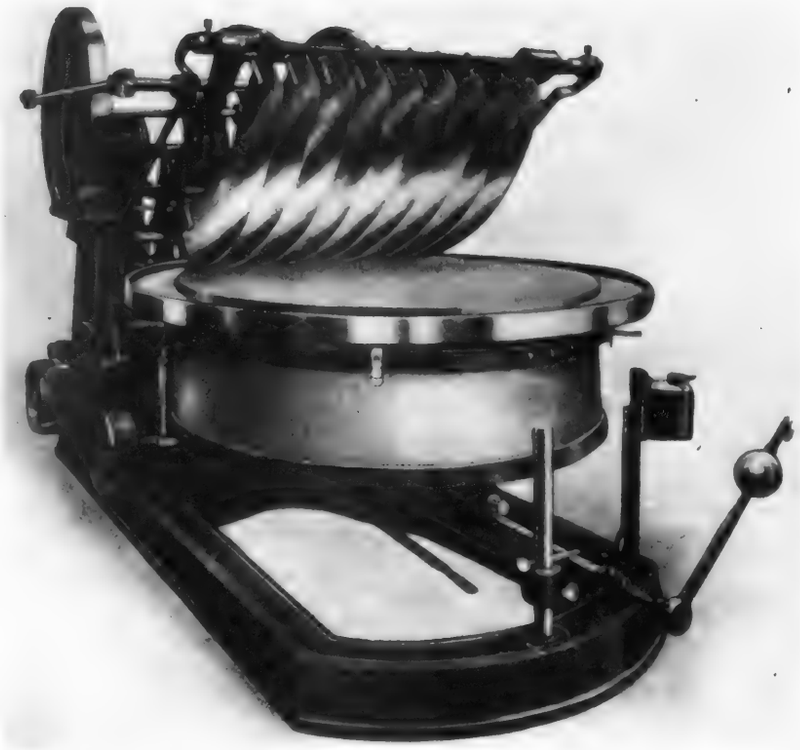


FIG. 3.—The Rocking Chopper.

## The Cold Smoking Process

Here the problem is to remove the water from the sausage at the lowest possible temperature. The temperature in the kiln must not in general exceed approximately 82° F. (30° C.), and depends on the melting point of the fat contained in the meat. If too high a temperature is employed, a layer of fat collects between the skin and the filling in the lower part of the sausage, thus spoiling the appetising appearance of the product. Consequently, the cold smoking process takes a longer time than the hot smoking process, although there are only two different, but more or less distinct, stages of treatment, the drying period and the smoking period.

Although the cold smoking process is much more easily carried out than the hot one, if a satisfactory kiln is available, it is very difficult to give practical directions for the construction of cold smoke stoves. The particular design must be worked out on the actual spot where the kiln is to be erected.

## The Soft Sausage

The several brands of spread sausages are rather similar to each other, differing mainly in the combination of spices employed. They are known as:

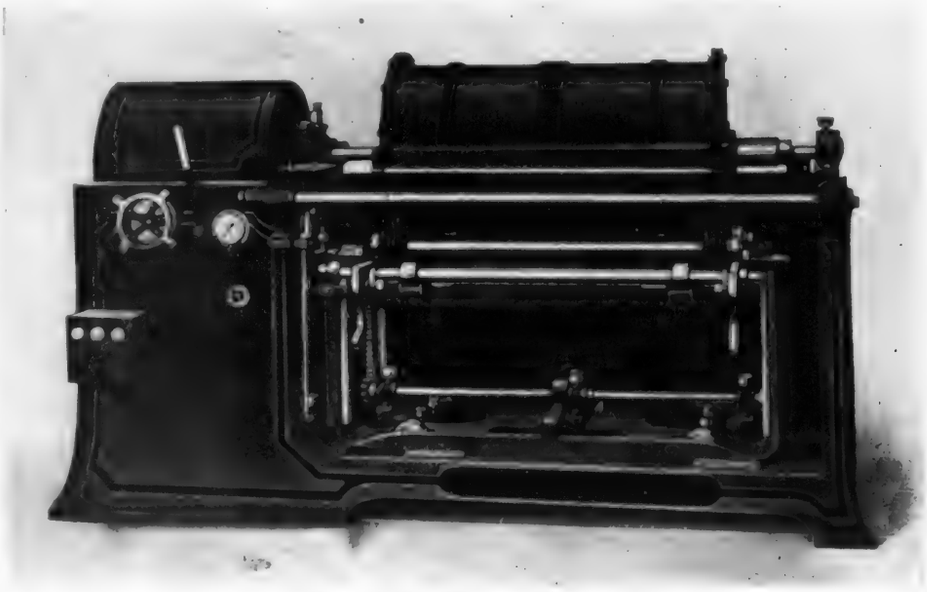


FIG. 4.—The Cylinder Chopper.

"Metwurst."
"Teewurst."

Generally they are called "Rügenwalder" sausage and "Braunschweiger" sausage, after the German cities Rügenwalde and Braunschweig (Brunswick), where these brands are manufactured in greatest bulk and best quality.

These sausages are made of an extremely finely hashed mixture, the preparation of which cannot be carried out in the bowl chopper or the mincer. In these machines too great an amount of the mechanical work of the knives would be converted into heat and transferred into the meat, thus making it greasy. This fact is easily to be understood, specially when taking into account the fine perforations of the mincer plates through which the meat has to be pressed. Moreover, many difficulties would be experienced in the manufacture of plates having very fine holes.

Therefore the meat receives only the first hashing in the mincer. For the finishing process of the sausage mass two different types of machines have been developed.

The first one is the Rocking Chopper (Fig. 3), which is generally equipped with a set of nine rocking knives, although sets of only seven or even five knives are to be seen on some makes.

The chopping block rotates slowly while the machine is in action. The knives chop the meat by their rocking movement, and it is important that they should execute a slicing cut.

During the preparation on this machine, all flavouring and colouring, *i.e.*, pickling ingredients, are added. The whole mass has to be mixed thoroughly. This is carried out by a wooden scoop (Fig. 2), which has to be used in unison with the rocking of the knives. In order to make this job safe and also to keep the meat sufficiently cold, the machine ought to be placed in a separate room. The working takes about fifteen minutes. The rocking block, which should be made out of best beech timber, must be kept extremely clean by scraping from time to time.

The disadvantages of the rocking chopper are the destruction of the block and the occasional working of splinters of wood into the sausage mass.

Still another machine which can be used in place of the rocking chopper and which avoids the disadvantages of the latter, is the cylinder chopper (Fig. 4). It can be regarded as a large bowl chopper in which the rotating bowl is replaced by a cylinder travelling to and fro; this is divided up in the direction of its length. The lower half of the cylinder can be dropped for the charging and discharging process. A further advantage of the cylinder chopper is the shorter working period, two to four minutes being sufficient. At the same time, the rocking chopper is frequently given preference, in spite of its drawbacks, in cases where an exceptionally high quality is demanded.

The cold smoking process for this kind of sausage is carried out in the manner described in Part I., but here it may be mentioned that in this particular case the independent smoke generator is of great advantage in that it protects the kiln from excessive heat and dust.

(*To be continued.*)

FIG. 5.—The Production of Cooked Sausages. Steam-jacketed Pans and Cooling Tanks are shown.

# ICE-CREAM CONTAMINATION

By L. H. LAMPITT, D.Sc., F.I.C.

THE FOLLOWING is Dr. Lampitt's Presidential Address to the Food Group of the Society of Chemical Industry in conjunction with the Royal Sanitary Institute's Health Congress at Bristol on July 12:

Contamination of ice-cream may be, broadly speaking, classified into two types: the first, chemical contamination, as, for instance, metallic impurities; and the second, bacteriological contamination. The former is easily denotable and, consequently, can be avoided or limited; moreover, any serious contamination of this nature would come within the scope of the Food and Drugs Act. The latter, contamination by bacteria, is obviously the form which requires our present consideration, and it appears to me, therefore, that our discussion should be devoted mainly to this very important aspect of the general question.

In making this suggestion, I am not forgetting that the composition of ice-cream has received some attention by health authorities, and that various standards for fat, for total solids, and for milk solids-not-fat have been put before the Institute. The Food Group of the Society of Chemical Industry, however, is not concerned with questions of composition unless legal standards have been set up or proposed, but it is certainly concerned with the freedom of food products from injurious elements. Therefore I should presume that the question of most interest, and, incidentally, the one of most pressing importance, is that concerned with bacterial flora of ice-cream and the means whereby contamination by, and growth of, micro-organisms can be reduced to a minimum in ice-cream. It may be argued that standards should be set, numbers of permissive organisms, naturally of a non-pathogenic nature, defined. It is, however, germane to the question to consider whether it is not paradoxical to set standards for ice-cream which, although being an everyday part of the diet of large numbers of the population, is still not a necessity, and to leave the milk supply inadequately guarded; for, after all, the grading of milk, admirable as it is, and to be supported as a first step in the right direction, does not, unfortunately, mean that the milk supplies of the country are satisfactory. Yet this is not strictly a sound comparison, unless it be admitted that all milk should be pasteurised—then milk and ice-cream both become processed products; both are submitted to heat treatment and both might, therefore, be required to comply with certain limiting bacteriological standards. Generally speaking, the freezing process has no effect on the actual viability of the organisms likely to be present in the raw "mix," and therefore, initially, it is the condition of the ice-cream immediately before freezing that forms the datum line on which a judgment is to be based. The methods of serving the ice-cream is an altogether different question and, I submit, one aspect of the general one of the distribution of food. Air-borne bacteria are as likely to settle on unwrapped bread as on ice-cream; dirty knives will contaminate cold meats as will dirty spoons ice-cream. I mention this because people who should know better are prone to talk of the dirty water in which ice-cream utensils may be washed, without considering the dirty swabs which may be used to wipe knives used in dispensing cooked meat.

In all questions of this nature the patent difficulty is to define standards which shall be equable to all types of manufacturers, but I would submit that this should not be an over-riding consideration. If medical and scientific opinion generally decide, irrespective of methods of manufacture, that ice-cream containing above a certain number of organisms is a menace to health, then those standards should be set, and if certain classes of manufacturers are penalised by such limits, it can only be regarded as a good thing for the nation that they are forced to amend their ways or cease manufacture. My own experience enables me to say—as in my laboratory samples of many types and kinds of ice-cream, sold in all parts of the country, have been examined—that it does not follow that ice-cream produced by a big firm must of necessity be bacteriologically sound, whilst that produced by a "small" man is certain to be unsatisfactory. In this I agree with evidence put before the Institute in 1930 by Dr. Thierens.

Pasteurisation, colouring matter, and flavours may cover up many deficiencies in the raw materials, and it appears to me that the *quality* of the raw materials is not the least important of the many considerations in the production of a satisfactory product. Incidentally, I would stress that I only include in my definition of ice-cream those foods which contain milk constituents, sugar, flavour, and colouring matter, with the addition of a small amount of stabiliser such as gelatine. Frozen products of the starchy variety should not be called ice-cream, neither should water ices, although any legislation must include these second-named products, which are becoming increasingly popular.

Speaking perhaps as a disciple of the big-plant idea, I personally cannot see that there is any excuse for insanitary ice-cream. Modern ice-cream plant has been designed to reduce to a minimum the possibilities of plant contamination. Fabian, in the States, expressed this somewhat forcibly by saying: "The ice-cream manufacturers . . . kept abreast of the times, and installed expensive pasteurising and refrigerating equipment in their plants while many health officers were still slumbering."

As Chairman of the Food Group of the Society of Chemical Industry, I can say that our members embrace the opportunity to discuss with the members of the Royal Sanitary Institute a problem which interests them not less than it does the medical officer and the sanitary inspector, and I regard it as an honour to have been requested to preside at this discussion.

# ENGLISH FRUIT CANNING

WE RECENTLY spent a most enjoyable and instructive day at the fruit canning factory of Messrs. Baird, Wolton and May, Ltd., at Barming, near Maidstone, Kent. The factory itself is seemingly in the heart of the country, yet it is only about two miles from Maidstone; it is situated almost at the top of a hill, and commands a magnificent view across the valley.

On arriving at the factory we were met by Mr. Aubrey Wolton, who took us on a "personally conducted tour" and showed us everything that was going on. We cannot do less than acknowledge here our gratitude to Mr. Wolton for his courtesy and the care with which he answered so lucidly our numerous questions.

The cannery, on a site covering twelve acres, is built on the most modern principles, steel, brick and corrugated asbestos sheeting being used for the construction; it is 300 ft. long, very lofty, and well lit by roof glazing. The contractors responsible for the work were *Hill and Smith*. The whole of the exterior and interior has been painted, one grey undercoat having been put on first, followed by one coat of aluminium paint, sprayed on.

The scores of girls busily engaged in filling cans made an imposing sight in their attractive blue overalls and caps as we obtained our first glimpse of the interior of the factory. Five hundred are employed at peak periods, and we were pleased to hear that the organisation knows no labour troubles; when we had had an opportunity of studying the conditions under which they work and the care which is devoted to their general well-being and happiness we were not surprised at this. A stool is provided for each girl at the bench.

Two plants are run capable of dealing with 60 2-lb. cans per minute, and two plants handling 80 per minute; each of these plants is capable of an output of 24,000 cans per day. Large fruits, such as apples and plums, are packed in gallon cans, and the fifth plant, which handles these, can turn out 12,000 cans per day.

## Cherries and Gooseberries

Cherries and gooseberries were being canned on this particular day, and we first saw the fruit in shallow wooden boxes as they were being unloaded from lorries. The fruit, after entering the factory, is first washed, afterwards passing to the grading machines which have been specially designed, one for each type of fruit, to separate out the larger sizes from the smaller. Stalks are removed from the cherries by hand, but the gooseberries pass to a battery of ingenious "snippers", where the "tops and tails" are removed by friction against the carborundum-lined walls and floor of the machines. These were designed and built in two sizes by *Brierley, Collier and Hartley*. We also saw a fruit pulper made by this firm, which had been in continuous use for three years and was still in perfect working order.

## Filling the Cans

The fruit is next carried in large, round baskets to the filling benches and tipped out thereon; before

**A general view of the Cannery, showing part of the Main Building and the Canteen (with curved roof). A corner of the Syruping Room can be seen behind the canteen.**

these benches stand the girls in their blue overalls, as close together as is convenient for working, and their task it is to fill the cans, which they obtain from a column passing slowly before them on a cable conveyor at about shoulder level. When filled, the cans are placed on a moving belt below bench level, and pass to the next operation. But before describing this and subsequent processes, a few words must be said about the filling of the cans. This is not a purely mechanical process of shovelling the fruit into the cans, or it could, of course, be performed by a machine. On the contrary, care is needed in removing bruised and broken fruit, and any deformed specimens which would look unsightly when the can was opened. Exceptionally small fruits also are rejected. A further point, and one of considerable importance, is ripeness; we picked up from the bench a gooseberry which had been rejected, almost without a glance as it seemed. It looked a perfectly good gooseberry—in fact, a very nice one. We asked the girl why she had not put it in, and she said, " It is a little *too ripe*,

**A busy scene—filling the cans. The Cookers can be seen in a line running across the middle background.**

and if put in with the rest would go ' mushy ' in the can and might make some of the other fruits go soft too."

## The Syruper

After the filled can has been placed on the moving belt it is handled entirely by machinery. It passes first to the syruper, where it is almost, but not quite, filled with hot syrup. This is accomplished by filling the can in a slightly tilted position, and is important, for it has later to pass through an exhauster, and if the tin is filled to the brim with syrup there is, of course, no air to exhaust. All parts of the syruper in actual contact with the syrup are of *Monel* metal, including even the pumps used for returning the excess syrup from the sump back to the storage tank. In the operation of these pumps an initial difficulty arose due to an attempt having been made to run a *Monel* metal shaft on *Monel* metal bushes. Mr. Wolton's own solution of this—a very practical one likely to be of interest to others besides canners, to all, in fact, using or desiring to use *Monel* metal pumps—was to fit *lignum vitæ* bushes. These have now been in operation for two seasons, and the pumps which had hitherto exhibited a tendency to seize up have given uninterrupted service ever since this change was made. No lubrication is required as there is plenty of fluid present to serve this purpose all the time the plant is running.

We must now leave the cans for a moment while we take a look at the syrup pans; accordingly we climb a steep staircase at one end of the factory and come to a raised platform, from which we can look down into the pans. These steam-jacketed syrup boilers have inner pans and covers of *Monel* metal. Steam is supplied under 50 lb. pressure and 105 gal. of syrup are obtained from one boiling, and pass down to the syruper on the ground floor by gravity. All the pipe lines are of *Monel* metal.

## Exhausting

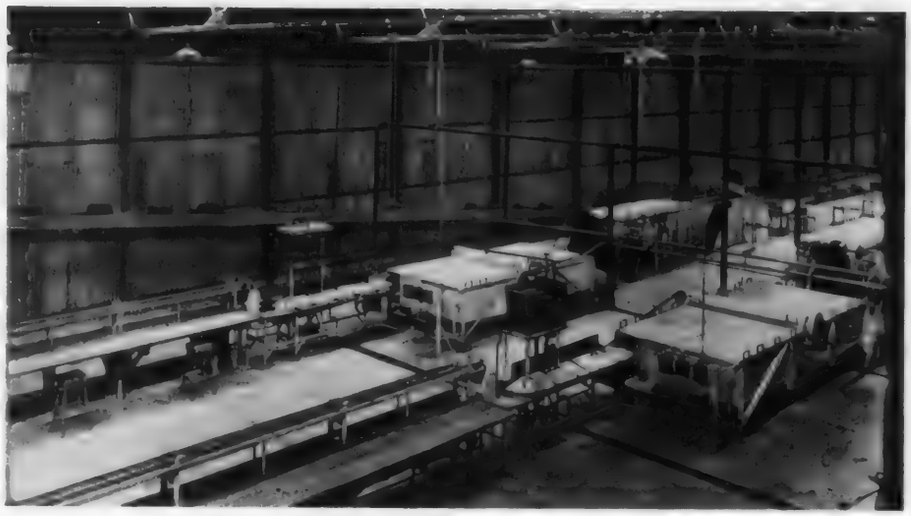
To return to the cans; after being almost filled with syrup as described, the cans pass to a rotary clincher, where the lids go on and are once clinched. They next go through the exhaust box, where a vacuum of up to 12 in. is applied and at the same time the temperature is raised. An important point to note at this stage is that if they are put through the exhauster without lids the top fruits are bleached; this is why they are put first through the clincher and the lids lightly affixed. Although the single clinching does not render the tins airtight —for it would be to no purpose to pass airtight tins through an exhauster—the presence of the lids is sufficient to prevent this bleaching effect, and the raised temperature prevents the re-entry of air when the tins leave the exhauster.

This exhaustion is necessary on account of the natural evolution of gas which always goes on even after the most rigorous precautions have been taken, as will be described later, to ensure that there are no live organisms in the

**One of the Syrupers, showing the Conveyor running in from the left and a Monel Metal Dispensing Tank.**

can when it leaves the factory. If this gas were to be evolved in cans already at atmospheric pressure, swelling would be inevitable and "blowing" likely. Complete exhaustion is unnecessary, and it is found that in practice the 12-lb. vacuum applied is always sufficient.

After vacuumising, the cans pass to the sealing machine, which puts a double roll on the lid; they are now airtight, and next comes the most important stage of the whole process, namely cooking.



A view of the interior showing two "general purpose" lines. At the back the whole process can be followed, from the Filling Benches through the Syruper, Vacuumiser and Double Sealer to the Cooker. Note that the Clincher does not appear in this early photograph. All pipe lines of Monel Metal.

## Cooking

Cooking is essential for sterilisation, and in Mr. Wolton's words, "The last second and the last degree F. kills the last organism." The optimum temperature and time of cook have been determined after considerable experimentation. Different outlets are provided on the cooker according to the time during which it is desired to subject the fruit to heat. The plant was built and installed by *F. J. Ballard and Co.*

The temperature of cooking lies between 200° and 212° F., and in any given instance depends on the nature of the fruit, as well as other considerations such as size, ripeness, etc. Strict adherence to the temperature known to be most suitable in a particular case is, of course, absolutely necessary, even to within 1° F., and such rigid conditions can only be achieved by thermostatic control. For this, reliance has been placed on *Short and Mason's* Single-duty Direct Set Recording Regulator, a delicate and highly accurate instrument which has proved very satisfactory for the job.

## Cooling

From the cooker the cans pass to a water spray cooler put in by *L.C. Engineering Supplies*; they travel on a slowly moving belt through fine water sprays, and are at the same time subjected to air cooling induced by the draught of high-speed fans.

A Battery of Steam-jacketed Syrup Boiling Pans with Monel Metal inner pans and covers.

This matter of cooling is extremely important, and Mr. Wolton said they actually try, in the case of raspberries, to pack at below air temperature, and usually succeed.

After cooling, the cans are packed and are then ready for dispatch.

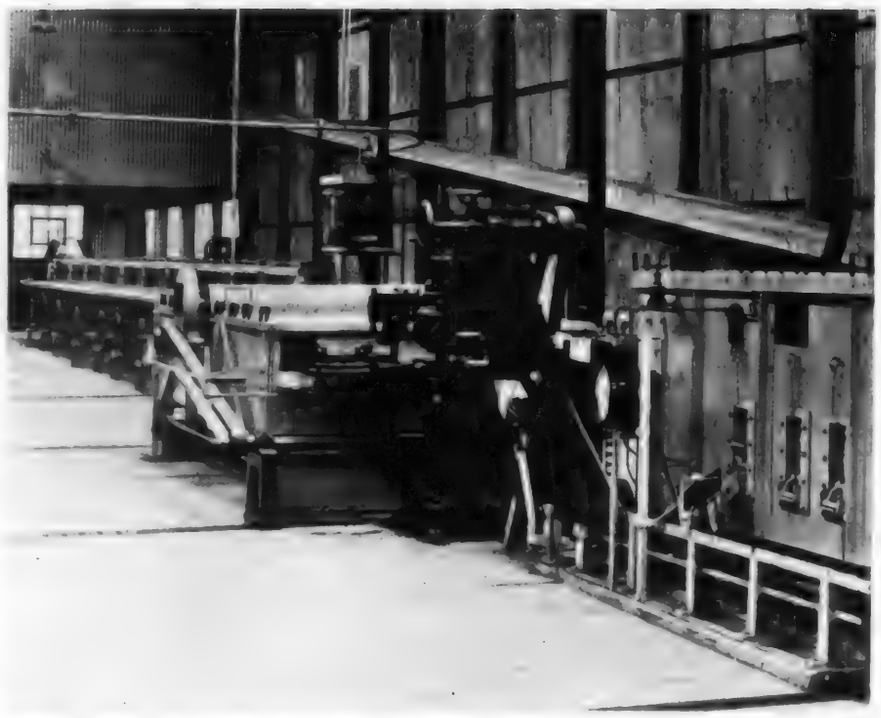
It was interesting at the luncheon interval to witness the process of "shutting down" and the progressive stopping of the machines as the last can went through. We were talking to one of the mechanics in charge, who incidentally was quite unlike the picture which is so often drawn, of a man "as soulless as the machines with which he lives and works", but on the contrary seemed to take a lively interest in all that he was doing. As the last can left the cooker on its way to the cooling plant, he placed a marked can on the conveyor "to tell the folk at the other end that they've got the last one". We later saw this marked can as it left the cooler, and watching it pass slowly on the moving belt to the exit we thought of the worker at the other end, waiting for the last can, and lunch. At last the marked can was carried to the end of the belt, the plant stopped, and all was quiet.

## The Canteen

We were now taken to the canteen, and although we had seen it from the outside, we got a real surprise when we went in and saw how spacious it actually is. There is room for seating 400 employees at a time, the canteen is well lit both naturally and artificially, and the general air of cheeriness is enhanced by a number of "fairy lights". The firm takes a special pride in the canteen, and with reason, for it is a real benefit to the employees to have a good meal available on the premises at cost price. We were informed that actually there is generally a small loss on the canteen, and we had no difficulty in believing this when we noted the following items, quite typical of the whole, on the bill of fare:

Cup of Tea—1d.
Portion of Steak and Kidney Pie—2½d.!

During lunch—the canteen certainly "did its stuff", and we must thank Mr. Wolton for the idea of iced tea with lemon, which was excellent—we heard a number of interesting things about the factory. Our host told us that he sleeps more soundly when he thinks of his *Monel* metal plant; it is certainly very good to be able to take the plant down after a year's working and to find it absolutely unaffected by corrosion. Stainless steel was unsuitable on account of welding difficulties, and when we heard of some earlier experiences with various metals in other plants, it was clear that the Barming Cannery is founded, if not upon a rock, on *Monel* metal.



Close-up view, showing Bench, Vacuumiser, Double Sealer and Cooker (note three outlets; a fourth is further to the right). Also Thermostatic Regulator on Cooker. The Syruper is hidden by the Vacuumiser, but the tank can be seen above. At the back, by the wall, is the conveyor for carrying boxes of empty tins to the store, and on the left, crossing the window, the conveyor down which the empty tins descend as required.

An interesting point arose in connection with the cans, which incidentally are made by *The Metal Box Co.*; we were informed that lacquered cans are employed rather more for the preservation of colour of the fruit than from any consideration of corrosion. Tinplate is, of course, not corroded by cold fruit juice, but there is nevertheless a deterioration in colour if not in taste, so lacquered cans are used. This actually introduces an extra risk of corrosion, if the lacquer film should be scratched through! If an unlacquered can is scratched through the tin to the iron, there is no corrosion because there is relatively a very large area of tin compared with the exposed iron surface. If, however, a lacquered can is scratched through the tin to the iron, there are approximately equal areas of tin and iron exposed, and vigorous corrosion sets in. The empty cans are received at the factory in "Fiberite" cases made by *Thames Board Mills*.

When we noted the loudspeaker in the canteen, we were told that they have a radio-gram, and that it is sometimes played in the factory while the girls are working. We were quite surprised to hear this, but it appears that this enterprising firm has done quite a bit of research in order to find out the particular type of music most suitable to a given occasion; sometimes dreamy music is put on, at others a quick-step goes down best, according to circumstances. Sometimes they play a humorous record to make them all laugh! And we were assured that the output was quite noticeably improved by these means.

A Section of the Laboratory.

## Bacteriological and Chemical Testing

Constant bacteriological examination is the keynote of the whole process at this cannery; one can from each batch is examined each day. On no single occasion during the past year has it been found necessary to reprocess any batches, which certainly justifies the care taken. There is a splendid laboratory at the factory, large and well equipped, which we saw in the afternoon; this is in charge of the Chief Chemist, Mr. L. H. Trace, F.I.C., B.Sc., and the whole of the supervision is run by a series of "budding chemists", young men working for their Intermediate B.Sc., who go to the cannery for one or two years' practical work. There are six of these under the Chief Chemist, and it is a full-time job. If the spoilage reaches a figure even so low as 0·25 per cent. a thorough investigation is immediately called for, which shows what may be achieved by scientific control; the cannery of Messrs. Baird, Wolton and May is certainly a model to the industry in this respect.

Very considerable extension has been undertaken since the opening ceremony a little over two years ago; new bays have been added to the main factory building and new plant has been installed. The progress that has been made in the English canning industry in comparatively few years is truly remarkable, and the good name which has been won will be more than upheld by the Barming Cannery.

# BACON CURING

By E. H. CALLOW, Ph.D.
Low Temperature Research Station,
Cambridge.

The following account of the curing of bacon has been abstracted, by the permission of the Controller of His Majesty's Stationery Office, from Food Investigation Leaflet, No. 5, recently issued. Copies of this leaflet can be obtained gratis on application to the Department of Scientific and Industrial Research, 16, Old Queen Street, S.W.1.

Other subjects dealt with in the leaflet are Preparation of Carcases, Colour, and Smoking.

CURING TAKES place in three stages. First, pickle is pumped into the sides; then they are either dry-salted or immersed in a tank of pickle; and, finally, they are allowed to mature. All three processes should take place in cooled "cellars," which nowadays are usually well-insulated rooms above ground-level. The temperature of these cellars should be between 38° and 45° F. The choice of temperature is necessarily a compromise. The higher temperature hastens the penetration of salt into the meat, but also increases the risk of spoilage by micro-organisms; the lower temperature prolongs curing, but gives an extra margin of safety against spoilage, and is therefore recommended for small factories and for curers who aim at a very mild cure. In most factories a temperature of 42° F. is employed. Higher temperatures, up to but not beyond 45° F., are advisable only in large factories in which all the processes are carefully controlled. In all cases, the temperature chosen must be rigidly maintained, and not allowed to fluctuate more than 1° or 2° F. in either direction. Exact control of the temperature is one of the most important factors in the standardisation of any cure.

## Introduction of Pickle by Pumping

In order to introduce the salt into the meat as rapidly as possible, it is customary to inject pickle under a pressure of 75 to 80 lb. per sq. in. Pump-pickle is a strong solution of salt, with an addition of saltpetre to the extent of about $\frac{1}{10}$ the weight of the salt. The concentration of salt may vary from 25 to 30 per cent., and the saltpetre from 2·5 to 4 per cent., according to the particular recipe being used.* For sweet cures a little sugar (0·5 to 1 per cent.) may be used. The precise composition of the pump-pickle depends on the type of bacon required. For a very mild cure, a relatively weak pickle may be used (*e.g.*, salt 25 per cent. and saltpetre 2·5 to 3 per cent.), but this is not recommended, either for the small factory or for curers who wish to make tank-cured bacon according to Continental methods. For these cases, a pickle containing 30 per cent. of salt and 3 to 4 per cent. of saltpetre is more suitable, since the salt penetrates into the meat more rapidly, and a harder cure results.

The salt used in the pump-pickle should be as pure as possible, and only Bengal saltpetre (*i.e.*, potassium nitrate) should be used. The quantity of sugar, usually Demerara, for a sweet cure must be decided by the individual curer, but it should not exceed 0·5 per cent., unless the control in the factory is very rigid.

The ingredients of the pickle used in pumping should be well mixed in a large vat, filtered and cooled down to the curing-cellar temperature. It is usual to pump the pickle into all lean parts of the side. The gammon should receive most, the shoulder-end slightly less, and the back should be pumped lightly or not at all. Altogether about 18 to 25 injections are required; the total amount of pickle retained by a side varies, but should not exceed 5 per cent. of its weight. Each side needs individual treatment, so that pumping must be carried out by a skilled craftsman.

* When boric acid, the use of which is now illegal, was commonly used in pickles, it was possible to use more sugar than is now the case without risk of spoilage. Old recipes for pickles containing sugar should, therefore, be used with great caution.

The shoulder-pockets of the pumped sides are filled with salt, and the sides are ready to be either tank-cured or dry-salted. At present, most of the Wiltshire bacon made in this country is dry-salted. Practically all our imported bacon, however, is tank-cured Wiltshire bacon.

## Tank-curing

Large curing tanks capable of holding several hundred sides are usually constructed with a cement floor and glazed-brick or cement sides. Small tanks are less satisfactory, and they are usually made of slate or wood. Unless the wood is impregnated with paraffin-wax, it is unsuitable for this purpose, for it is difficult to keep it free from undesirable micro-organisms. In a large tank the sides are stacked 10 to 12 deep, and while being stacked they are lightly covered with salt and a trace of saltpetre (not more than one-tenth the weight of the salt). When the tank is full of sides, they are battened down by means of large boards and the tank-pickle is run in. The sides are left in the tank for about four to five days. The battens are then removed, and the sides floated out of the tank by running in extra pickle.

Tank-pickle is an interesting fluid. When first prepared it contains from 23 to 28 per cent. of salt according to the recipe used. It may also contain from 3 to 4 per cent. of saltpetre. In this initial raw state, however, it is useless for curing. It must first of all be matured. This can be done by using it in the curing cellar for salting (not curing) pigs' heads or pork. By this means, meat-juices containing a trace of blood are introduced into the pickle. This encourages the growth of specific micro-organisms, which convert a little of the saltpetre (potassium nitrate) into nitrite. The pickle is now mature, and can be used for curing.

Tank-pickle is used over and over again. When a batch of sides is removed from the curing tank, the pickle should be carefully filtered and pumped into a special storage-tank. The pickle should be introduced from above, and allowed to splash down into the storage-tank. A foam is thus formed, and when the storage-tank is emptied, the foam remains behind and is thrown away. This method is probably better than allowing the pickle to flow gently into the storage-tank, as the splashing thoroughly aerates the pickle, and the subsequent removal of the foam helps to eliminate impurities. The special storage-tank should be kept at the same temperature as the curing cellar, and should be large enough to hold all the pickle from the curing tanks. Whenever possible, all the pickle from the curing tanks should be bulked in the storage-tank, so that its composition can be kept constant, and the cure be more adequately controlled. Each batch of sides removes some salt and saltpetre from the pickle, and thus it tends to become weaker. This is prevented by the addition of salt and saltpetre by sprinkling the sides when they are being stacked in the tank. The amount of saltpetre used should be about one-tenth of the weight of salt used. In this way the strength of the pickle can be kept constant, and should be kept at some chosen point between 22 and 24 on the Baumé hydrometer,* according to the recipe used.

* This represents a density of 1·180 to 1·199.

After a batch of sides has been removed from the curing tank, the pickle is found to have increased in volume. This excess can be used for pickling heads, feet, and other "small goods." In a well-controlled factory it might even, after experiment, be incorporated in the pump-pickle. Owing to the presence of nitrite, such pickle would hasten the production of colour in the bacon (see p. 6 of the Leaflet). The use of tank-pickle in the pump-pickle may, however, increase the risk of spoilage, and is not recommended for small factories. When tank-curing is undertaken for the first time, it is advisable to begin on the experimental scale. As the volume of pickle increases with use, the scale of operations can be extended until the pickle finally required has been accumulated, and full-scale production is possible. In this way the pickle would be well-matured before an appreciable amount of curing was done.

## Dry-salting

As in tank-curing, the first operation in dry-salt curing is to pump pickle into the sides. After this, the shoulder-pockets are filled with salt, and the sides are brushed over with pump-pickle to moisten the surface. They are then placed, skin downwards, on the floor of the curing cellar in piles of eight to ten sides. During stacking, each side is sprinkled very lightly with Bengal saltpetre and covered with salt. The weight of saltpetre used should only be about one-fortieth that of the salt. The sides are held horizontally by small wooden battens. As the salt and saltpetre penetrate into the side, some of the juices are forced out, and form a strong brine by dissolving the salt and saltpetre on the surface. This brine drains into the flank of each side. The sides are left in stack for five to ten days, and are then freed from salt by being dropped on to a slatted table.

## Maturing

The next process is similar for both tank-curing and dry-salting. The sides out of tank or out of stack are piled in the maturing cellar and left for seven or fourteen days to mature. In the case of dry-salted sides, this period may even be extended to twenty-one days.

The maturing cellar should be similar in construction to the curing cellar, and should be kept at a similar temperature, which should not be allowed to fluctuate more than 1° or 2° F. In any case, the temperature should not exceed 45° F. The lower the temperature, the longer sides take to mature. At high temperatures maturation is more rapid, but, unfortunately, there is a greater tendency for slime to form on the sides.

In this country maturing cellars must be not only well insulated, but also cooled by refrigerating machinery. In Denmark, the maturing cellars are insulated but not cooled, because the sides only remain there for one to two days. During this period, superfluous pickle drains away from the sides. They are then baled and despatched to this country, and maturation continues during the voyage. In English practice, however, the bacon is matured thoroughly before it leaves the factory; hence

the necessity for refrigerated, as opposed to merely insulated, maturing cellars.

In both dry-salted and tank-cured bacon, the salt and saltpetre become more evenly distributed throughout the tissues during maturation, and by the time that maturation is complete they have penetrated even to the bone-marrow. The typical colour of bacon also develops throughout the lean.

## Dry-Salt Curing *versus* Tank-Curing

### Control of the Cure

The tank-cure is more easy to control than dry-salting, and the risks of spoilage and of bone-taint also tend to be less in tank-cured bacon. On the other hand, dry-salting has the advantage that it more readily produces a very mild bacon; up to the present, our mildest bacon has always been dry-salted. Dry-salted bacon also matures more satisfactorily than tank-cured; moreover, with tank-curing there is the risk of the tank-pickle becoming spoiled if there is an over-production of nitrite.

### Quality of the Bacon

Dry-salted bacon is usually milder than tank-cured bacon, and is preferred for this reason. Apart from saltness, it is very doubtful whether the general public can distinguish tank-cured bacon from dry-salted bacon. Experts can, however, detect a better flavour (as distinct from saltness) in dry-salted bacon.

### Changes in Weight

A mature tank-cured side tends to weigh 2·5 to 4 per cent. more than a mature dry-salted side. During smoking, tank-cured sides lose about 1 per cent. more weight than dry-salted, but in spite of this smoked tank-cured sides still weigh about 2 per cent. more than smoked dry-salted sides.

# CHEMISTS MEET AT CARDIFF

## A GROUP OF MEMBERS AT THE FIFTY-THIRD ANNUAL MEETING OF THE SOCIETY OF CHEMICAL INDUSTRY

**Members of the Society of Chemical Industry photographed on the steps of the National Museum of Wales, Cardiff, on the occasion of the Annual Meeting, which was held in Wales, for the first time in history, from 16-20 July. In the middle of the front row is Dr. J. T. Dunn, the retiring President, and on his right is the new President, Alderman Edwin Thompson, a former Lord Mayor of Liverpool and head of the firm of Thompson and Capper Wholesale, Ltd. Dr. Lampitt and the Editor of FOOD MANUFACTURE are both included in the group.**

# Pressure in Cans

By
P. Chambellan
H. Cheftel
M. L. Thuillot
R. Boudeau

## PART III*—PRACTICAL APPLICATIONS

THE PRACTICAL applications of the theoretical considerations developed in the preceding paragraphs are very numerous. In the first place, the general formula enables us to study separately the influence of the various factors; this separate study is indispensable for understanding thoroughly what is occurring when the can is being submitted to the influence of heat. On the other hand, the calculation of the maximum pressures for the same final temperature but different initial ones shows how great an advantage is gained by sealing the can whilst it is hot, and the knowledge of this, together with what we know concerning the critical pressure giving rise to the formation of dents, suggests an easy means of avoiding this still too frequent trouble. We can also compare different sizes and shapes of cans and thus throw light on their respective advantages and drawbacks.

We shall not relate here all the calculations we have made. A few cases, chosen from among those which we consider as the most instructive, will be sufficient.

### Deformation of Ends

A scrutiny of Table I and Fig. 3 (p. 209) at once shows the advantage of the expanding ends; indeed, if the bottoms did not allow an increase of volume, the water expansion alone in some cases would certainly be sufficient to burst the can.

For instance, the capacity of an L6 can becomes 853·58 c.c. at 115° C. If it were filled while cold with 810 c.c. of water, the liquid would have a volume of 855 c.c. at 115° C. and could no more be contained in the can.

On the other hand, even if a larger free space were left, the pressures developed inside a non-expanding can would be excessive. It is very easy to verify this.

We will take an initial temperature of 10° C. and a final temperature of 110° C. and suppose that the can contains 80 c.c. of air, which corresponds to a free space of about 1 centimetre in height. That much being given, our can will contain 770 c.c. of water.

By increasing the temperature from 10° C. to 110° C., the capacity of the can is increased from 850 c.c. to 853·4 c.c. (Table I), whereas the volume of water goes up to 810 c.c. (Fig. 3). Consequently, at 110° C. the volume occupied by the air is only

$$853{\cdot}4 - 810 = 43{\cdot}4 \text{ c.c.}$$

and the corresponding pressure, inversely proportional to the volume, is

$$\frac{1{\cdot}033 \times 80}{43{\cdot}4} = 1{\cdot}9 \text{ kg.}$$

(1·033 kg. being the initial pressure=atmospheric pressure). On the other hand, when heated from 10° C. to 110° C., the air itself tends to expand, and the pressure resulting therefrom is directly proportional to the expansion binomial (Table IV). The pressure of 1·9 kg. due to the water expansion alone, will therefore become

$$\frac{1{\cdot}9 \times 1{\cdot}403}{1{\cdot}037} = 2{\cdot}6 \text{ kg.}$$

To this figure we have to add the vapour pressure and deduct the atmospheric pressure; consequently, the final relative pressure $P_f$, will be

$$P_f = F_f + p_f - P_v = 3{\cdot}0 \text{ kg.}$$

Such pressures as this would be a serious hindrance

* Continued from the June issue.

in the manufacturing of canned foods. It will be sufficient to note that the critical pressure, at which dents begin to form, is in the neighbourhood of 1·8 kg., and that in our calculations we did not take into account the influence of the dissolved gases.

On the other hand, in calculating the inner pressure due to the expansion of the water and of the air in a can provided with expanding ends, we get a good insight into the influence of the increase of volume which these expanding ends allow. In order to make this calculation we will go back to equation (4) (p. 211) and put:

$$t_i = 10°,\ t_f = 110°,$$

$$V_i = 850{\cdot}3 \text{ c.c., whence } V_i \frac{1+\Delta t_f}{1+\Delta t_i} = 853{\cdot}4 \text{ c.c. (Table I)},$$

$$v_i = 770 \text{ c.c., whence } v_i \frac{1+\beta t_f}{1+\beta t_i} = 810 \text{ c.c. (Fig. 3)},$$

$$s_i = 0,\ s_f = 0,\ F_f = 1{\cdot}462 \text{ kg. (Table II)};$$

$$P_a = P_e = 1{\cdot}033 \text{ kg.}$$

$$w_i = V_i - v_i = 80{\cdot}3 \text{ c.c.},\ EF_i = 0 \text{ for practical purposes};$$

$$\frac{1+\alpha t_f}{1+\alpha t_i} = \frac{1{\cdot}403}{1{\cdot}037} = 1{\cdot}35 \text{ (Table IV)}.$$

(Taking no account of dissolved gases). The calculation then gives

$$p_f = 1{\cdot}17 \text{ kg.}$$

and

$$P_f = p_f + F_f - P_e = 1{\cdot}6 \text{ kg.}$$

The figure obtained for $P_f$ shows (Fig. 2) that in our particular case the increase of volume due to the bulging of the ends is 51·5 c.c.

## Comparison of L6 and L7 Cans

The same calculation made for an L7 can under the same conditions and having the same free space of 80 c.c. shows that with non-expanding ends the inside pressure $P_f$ would reach 28·65 kg., but in the can provided with expanding ends this value is only 2·1 kg.

The difference between the L6 and the L7 cans is well known in practice, since the formation of dents is very frequent in the L7 can.

It is clear that this difference is due to two causes which operate in the same direction: firstly, *the ratio of height to volume*, the influence of which is evident from Fig. 4 (p. 211) and the calculations appertaining to it; secondly, *the ratio of the total volume to the possible increase of volume*, this latter being, all other conditions remaining equal, 6 per cent. for the L6 can and only 3 per cent. for the L7 can.

Fig. 4 shows that there is an advantage in well filling the L6 can. The L7 can, on the contrary, demands a free space of at least 100 to 150 c.c. (a height of 13 to 20 mm.), because the inner pressure increases enormously when the free space approaches zero.

These considerations throw light on the unsuitability of the L7 shape, as well as of all tall cans with small diameters. In practice it is always advisable to choose a convenient proportion between diameter and height—that existing in the L6 can for instance—and adopt it for other cans of different capacity.

## Hot Sealing

The adoption, in 1847, of the expanding ends invented by Allen Taylor was therefore a big step forward, as the foregoing calculations show. The next stage in the progress of technical improvement was to seal at a high temperature. This avoided subjecting the can to excessive and disproportionate stresses.

Let us now calculate, by means of equation (4), the pressure $p_f$ in an L6 can for the initial temperatures of 10° C. and 60° C. and for a final temperature of 110° C., the initial and final outward pressures being equal to the atmospheric pressure.

We will assume a free space of 80 c.c. and the hygrometric state E of the air equal to 0·75. Then we shall have in the first case (sealing at 10° C.):

$$t_i = 10°,\ t_f = 110°;$$

$$V_i = 850{\cdot}3 \text{ c.c.},\ V_i \frac{1+\Delta t_f}{1+\Delta t_i} = 853{\cdot}4 \text{ c.c.}$$

$$v_i = 770{\cdot}3 \text{ c.c.},\ v_i \frac{1+\beta t_f}{1+\beta t_i} = 810 \text{ c.c.}$$

$$s_i = 0{\cdot}0226,\ s_f = 0{\cdot}0105;\ F_i = 0{\cdot}0125,\ F_f = 1{\cdot}462;$$

$$P_e = P_a = 1{\cdot}033;$$

$$w_i = V_i - v_i = 80 \text{ c.c.};\ E = 0{\cdot}75,\ EF_i = 0{\cdot}0094;$$

$$\frac{1+\alpha t_f}{1+\alpha t_i} = \frac{1{\cdot}403}{1{\cdot}037} = 1{\cdot}35,$$

and consequently

$$20 p_f^2 + 72\, p_f - 111{\cdot}6 = 0 \text{ and } p_f = 1{\cdot}17 \text{ kg.}$$

**Shipping Tinplate from the Port of Basse-Indre.**

In the second case (sealing at 60° C.) we shall have:

$$t_i = 60°,\ t_f = 110°;$$

$$V_i = 851\,9,\ V_i \frac{1+\Delta t_f}{1+\Delta t_i} = 853{\cdot}4 \text{ c.c.}$$

$$v_i = 771{\cdot}9,\ v_i \frac{1+\beta t_f}{1+\beta t_i} = 798{\cdot}1 \text{ c.c.}$$

$$s_i = 0{\cdot}0120,\ s_f = 0{\cdot}0105;\ F_i = 0{\cdot}2023,\ F_f = 1{\cdot}462;$$

$$P_e = P_e = 1{\cdot}033;$$

$$w_i = V_i - v_i = 80 \text{ c.c.};\ E = 0{\cdot}75,\ EF_i = 0{\cdot}15;$$

$$\frac{1+at_f}{1+at_i} = \frac{1{\cdot}403}{1{\cdot}2199} = 1{\cdot}15,$$

and consequently

$$20\,p_f^2 + 91{\cdot}88\,p_f - 90{\cdot}6 = 0 \text{ and } p_f = 0{\cdot}833 \text{ kg.}$$

The effective pressures $P_{f_r} = F_f + p_f - P_e$ which the can will have to resist are 1·6 kg. in the first case and 1·26 kg. in the second.

Thus we see that hot sealing gives a decrease of about 350 gm. of the inside pressure. The resistance of the can and the tightness of the seams are thereby increased, and this technical method, already universally adopted in the United States and in England, will certainly be taken up everywhere in Europe before long. It is evident that in the case of the L7 can, for instance, sealing at high temperature will always ensure that the pressure is kept below the critical point at which dents are formed, and this gives a considerable increase in the "security coefficient" in canning.

Moreover, it is easy to see that a can sealed at high temperature, once cooled down, has a partial vacuum above the contents, theoretically amounting to about 0·4 kg. This figure is obtained by substituting $t_i = 60°$ C. and $t_f = 10°$ C. in the development of equation (3) for an increment equal to zero.

It should be noted that this calculation cannot be made using equation (4), because this latter has been established for expansive cans and holds good only when the increment of volume is a linear function.

The vacuum obtained by sealing at high temperature keeps the bottoms well drawn in under all climatic conditions, and diminishes the importance of all the chemical phenomena accompanying the presence of air (corrosion, oxidation by vitamins, formation of rust, etc.)

In reality the inside pressure is less than our calculation shows it to be, for in this case deformation of the can brings about a *decrease* in its volume. By studying the variations of volume in relation to degree of vacuum it would perhaps be possible to establish an equation enabling calculations to be made, taking into account this phenomenon. But we did not consider it necessary to follow up our study in this direction.

### Cooling Under Pressure

Another very important step forward in the treatment of cans has been made by letting the cans cool down under pressure in the autoclave itself, after the sterilizing process has been concluded. In this method cold water is introduced into the autoclave while at the same time its pressure is kept at the point reached during the processing; in this way the cans are cooled down to a considerable extent *before* the release of pressure in the autoclave begins; consequently when, by opening the clearing cocks, the counter-pressure on the cans is released, their temperature has already been lowered to such a point that no fears of excessive deformation need be entertained.

The machinery used for this operation will be described in a subsequent part of this article.

(*To be continued.*)

## RECENT PATENTS (Continued from page 302.)

408,034. **Filtering media.** WEBER, A., 9, Town Lane, Southport, Lancashire.
A filter pad, particularly for filtering milk, consists of compressed cotton wool without adhesive or backing. The cotton wool may be compressed in sheet form or after being cut up into pads. The cotton wool may be subjected simultaneously to heat and pressure and may have a pattern embossed upon it—*e.g.*, by passing between heated embossing rollers.

408,362. **Dried yeast stabilisers.** INTERNATIONAL YEAST CO., LTD.
The addition to yeast, before or after drying, of a non-nitrogenous pectinous or mucilaginous colloid in small percentage has been found to preserve the baking activity after long storage. Suitable additives are citrous or apple pectin or aqueous seaweed extracts, which appear to protect the yeast cells against excessively sudden withdrawal of water and its fatal consequences. Their stabilising action during storage is apparently due to the maintenance of the yeast water content in the proportion essential to continued vitality. When utilising apple pectin in accordance with the invention, the commercial solution is stirred in with the moist yeast in quantity equivalent to 4 per cent. of the dry weight of the yeast. The mix is extruded and dried on a static drier for six hours at 30° C., when the final product contains 11 per cent. moisture and baking strength remains unimpaired after fifteen weeks' storage. The recommended proportion of seaweed extract (agar-agar) is 0·4 per cent. of the dry yeast weight.

408,613. **Improving "hard" coffee.** ORNO-ORNFELD, E., and LOEW, O. M.
Treatment with a volatile aldehyde is claimed to eliminate the objectionable aroma and flavour of "hard" coffee beans and so permit them to be blended in increased proportion with high-grade coffee beans. Furthermore, the process is held to improve all grades of coffee beans. Example: Mix 1,000 kgm. hard raw coffee beans in a closed apparatus with 500 litres of 1 per cent. aqueous acetaldehyde solution, allow to stand for ten hours, drain off superfluous liquor, dry and store till required for roasting. While the process is held to cover the use for this purpose of all aldehydes volatile at coffee bean roasting temperature, substances specially mentioned in this connection are formaldehyde, acetaldehyde, and benzaldehyde.

## CORRECTION

OUR attention has been called to an error which appeared in our report of the Food Congress in Paris (May issue). In the outline of M. H. Cheftel's paper on Thermophilic Bacteria it was stated that *B. stearothermophilus* is responsible for the bulging of canned legumes. M. Cheftel points out that this organism, which has been described by Donk, is a typical representative of the flat sour spoilage bacteria, and as such cannot be responsible for swelled cans, since its growth is not accompanied by any evolution of gas.

*Industrial News*

# BRITISH CITRIC ACID—RESEARCH APPOINTMENTS — NEW "BRUSH" PLANT AT SHOW—ADVERTISING EXHIBITION COMING—GELOZONE FOR ICE-CREAM POWDERS—BOXES—NEW COMPANIES—BOARD FOR CARTONS

## British Citric Acid

Some of the trade papers have recently been giving a good deal of publicity to foreign citric acid, and we feel sure that our readers will be glad to be reminded that Messrs. John and E. Sturge, Ltd., of Wheeley's Lane, Birmingham, as well as a number of other British firms, manufacture this material and are in no way behind their foreign competitors.

The low prices that have for some years been ruling for citric acid have inevitably focussed attention on the possibilities of using this acid to replace tartaric acid, which is now nearly 50 per cent. dearer than citric.

For many purposes, the extra molecule of water contained in citric acid has prevented such a substitution, but this objection is entirely avoided by the use of exsiccated or anhydrous citric acid, from which the extra molecule of water has been removed.

Now that citric acid of entirely British manufacture is available to all consumers in this market, there is an additional reason for interest in the anhydrous product.

Owing to this revival of interest the material is now being offered in several very attractive forms, varying from powder to bold granules, and consumers should certainly acquaint themselves with the properties of this interesting product.

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## Canadian Trade

In *Chemical and Allied Products in Canada*, 1931-1932, published 1934, price 25 cents, readers of this journal interested in the Canadian market will find comprehensive statistical information relating to The Flavouring Extracts Industry (Chap. 15) and The Miscellaneous Chemical Products Industry (Chap. 16), including baking powder, junket, cheese colours, etc., as well as The Fertiliser Industry (Chap. 6).

## Research Appointments

The Lord President of the Council has appointed Mr. E. Barnard, D.S.O., M.A., to be Director of Food Investigation in the Department of Scientific and Industrial Research, and Mr. F. Kidd, M.A., D.Sc., to be Superintendent of the Low Temperature Research Station, Cambridge. Both these posts were previously held by the late Sir William Hardy.

Mr. Barnard has been Assistant Director of Food Investigation since 1931. He joined the Department of Scientific and Industrial Research on entering the Civil Service in 1919.

Dr. Kidd, who has been on the staff of the Low Temperature Research Station since its establishment in 1922, has been engaged on Food Investigation work under the Department since 1918.

## Bakers' Exhibition

The Confectioners', Bakers', and Allied Traders' Thirty-Eighth International Exhibition and Market will be held at the Royal Agricultural Hall, London, N. 1, during the period September 8 to 14.

Entries (at 2s. 6d. per entry) close on Wednesday, August 22, but late entries at an increased fee can be received until Friday, August 31. A schedule of competitions and entry forms for the bread and confectionery sections can be obtained from Mr. H. S. Rogers, Managing Director, The Trades' Markets and Exhibitions, Ltd., 11, Queen Victoria Street, London, E.C. 4, to whom all completed entries are to be addressed.

Technical enquiries should be addressed to the Secretary of the particular section.

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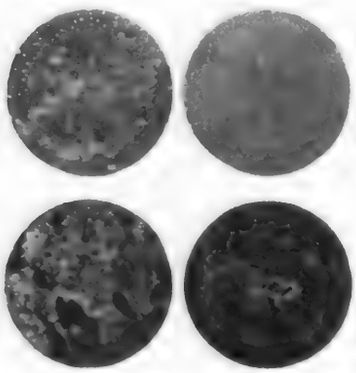
The Automatic Wrapping Machine described in these columns last month.

## New "Brush" Plant at Show

We hear that the Brush Electrical Engineering Co., Ltd., were exhibiting some of their equipment at the Royal Agricultural Show recently held at Ipswich.

Our illustrations show the new "Brush" cold-starting Diesel engine, a "Brush" homogeniser, and typical examples of the sort of results that are obtained by its use.



These "before and after" photomicrographs demonstrate very clearly what can be done with so-called "emulsions" by putting them through this machine. The first is sterilised milk. Now this is, of course, already quite a good emulsion, yet the improvement is striking, and keeping quality and digestive properties are also claimed to be better. Comparable results are obtainable with pasteurised milk. The second is a proprietary brand of fruit sauce, and here the difference is much more marked. The emulsion has a very smooth texture, the fibres are broken up and there is no sedimentation or separation.

Other plant on show at this company's stand included three induction motors, a pole type transformer, and their new compounding equipment on a switchboard panel.

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## Lifting

Not only is the depression "lifting", but Messrs. Crofts (Engineers), Ltd. (Thornbury), Bradford, have just issued a new leaflet describing their Friction Cranes and Crane Hoists. These can be supplied as simple lifting and lowering cranes for single or multi-storey buildings, or as independent friction hoists for fixing in any position. They are adaptable to motor or lineshaft drive.

Particulars of standard sizes, with general dimensions and prices, are given in the leaflet.

## Advertising Exhibition Coming

Bush House, Aldwych, London, will be the scene of what promises to be one of the most ambitious advertising exhibitions ever held in this country.

The Regent Exhibition, which will be held between October 5 and 13, will be divided into six sections.

That devoted to political poster advertising will endeavour to show how Fascism, Communism, the N.R.A., and other political creeds are propagated.

Suggestions for advertising campaigns which might be undertaken by the British Government will be laid out; also campaigns which collective organisations might profitably commence at once.

Another instructive division will cover "1934 Advertising with Suggested Typographical Improvements."

Photographs of *happiness* will be very informative, and the part devoted to this subject is certain to be a very popular feature of the exhibition. Exhibits in this class may be sold through the agency of the Regent Advertising Club.

The section "New Packs for Old Products" is expected to bring out a number of new substances specially suitable for the packing of particular types of product, as well as many novel designs, and the section "Christmas Designs of Every Kind" has been included in an effort to remedy the lack of new ideas on the Christmas theme. It is hoped to reanimate the Christmas tradition.

The designs entered in each of these classes will be put on sale if desired.

Large numbers of entries in the competitive sections have been received from interested firms in all parts of the country, and rivalry for the prizes (10 guineas, 5 guineas, and five prizes of 1 guinea, in each class) is certain to be keen.

Readers able to be in London at the time of the exhibition are urged to see it, as they may be certain of getting an insight into up-to-the-minute advertising ideas.

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## Milk in Bread

Almost in answer, it would seem, to the controversy on this subject which our readers are following with such interest, Messrs. Dried Milk Products, Ltd., send us "Better Bread—101 Milk Questions Answered for Bakers".

This little booklet contains, as well as the 101 questions and answers, tables for "reconstituting" milk or condensed milk from dried separated milk and a table showing comparative formulæ and costs for water bread and milk bread.

## Gelozone for Ice-Cream Powders

In connection with the article "Ice-Cream Powders" which appeared in our June issue, readers will no doubt be interested to learn that Gelozone, made by Whiffen and Sons, Ltd., of Carnwath Road, London, S.W. 6, is specially recommended by the makers as a colloid for incorporation in these mixes. Incidentally, Gelozone is also being used very successfully as a colloid in the manufacture of such products as sauces, soups, emulsions, lemon curd, creams, etc., and the applications of this interesting material are certain to be extended widely in the near future as investigations demonstrate its usefulness as a compounding ingredient for other purposes.

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## Boxes

Messrs. Robinson and Sons, Ltd., have recently brought out a very well-produced brochure descriptive of some of their boxes; this is amply illustrated, and the recorded impressions of a journalist as he was being shown round the works give an interesting insight into many of the processes involved in modern box-making.

To enumerate half the specialities included, which are themselves only a selection, would occupy the remainder of this column, but among those of interest to food manufacturers are boxes for lemonade crystals, table salt, spices, mustard, baking powder, chocolates, etc. Wax-impregnated boxes are a speciality of this firm, and are recommended for packing ices, potted meats, fruits, cakes, cheese, fish, etc.

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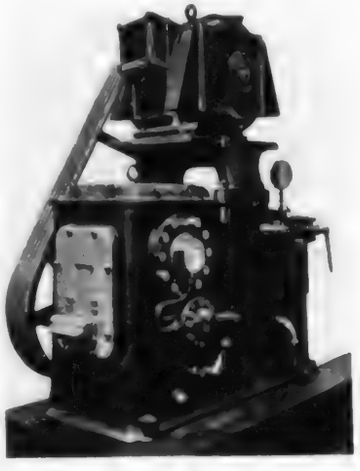

The "Brush" Homogeniser.

## New Companies

We have received from Messrs. Jordan and Sons, Ltd., Company Registration Agents, Chancery Lane, London, the following information concerning company registrations at Somerset House during the period January 1 to June 30, 1934. The particulars are presented in tabular form, and were extracted from the table compiled by Messrs. Jordan and Sons, covering all classes of industry.

| Class. | Public Companies. Number Registered. | Public Companies. Capital. | Private Companies Number Registered. | Private Companies Capital |
|---|---|---|---|---|
| | | £ | | £ |
| Drink. | 4 | 2,425,000 | 71 | 240,277 |
| Farmers and Planters. | 12 | 1,026,000 | 50 | 310,655 |
| Food. | 12 | 995,100 | 532 | 2,068,304 |
| Nurserymen. | — | — | 41 | 104,510 |
| Totals of all Classes. | 230 | 43,256,124 | 6,340 | 30,240,196 |
| *Corresponding figures first half of* | | | | |
| 1933. | 155 | 16,040,275 | 5,485 | 20,270,891 |
| do. 1932. | 108 | 5,254,458 | 4,085 | 28,803,098 |
| do. 1931. | 135 | 6,380,072 | 4,202 | 21,318,880 |

Comparison of the totals with those for the corresponding part of the three previous years shows clearly that the up-trend of trade is now firmly established.

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## Morris Commercial Reduce Prices

Further tangible evidence of the rapid strides this country is making towards prosperity is supplied by the announcement of the reductions in price, effective as from July 1 last, of Morris-Commercial vehicles.

Cheap and efficient transport is the life-blood of commerce, and this all-British concern, the largest in the world specialising exclusively in the production of commercial vehicles, having proved that British materials, workmanship, and organisation can produce vehicles without equal in efficiency, now plays its part in further reducing transport costs.

It has always been the policy of Morris-Commercial Cars, Ltd., to attune prices to production—a traditional policy which they consider to be the only fair one from the point of view of the commercial vehicle user, fighting to regain lost markets. We feel sure that this firm, which has done more than any, perhaps, to develop British road transport to its present high standard of efficiency, will be rewarded by establishing a still more commanding position in the commercial vehicle market.

## Board for Cartons

In case, after reading "New Packs at Exhibition" in these columns last month, any of our readers should have formed the opinion that Messrs. Thames Board Mills, Ltd., manufacture folding cartons, etc., we should point out that this firm produces only the board from which cartons are made. The boxes in many different shapes and sizes displayed on their stand gave a very good idea of the range of application of their board.

The interest of Messrs. Thames Board Mills, Ltd., in packing is confined to their "Fiberite" cases.

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## For Every Meal

Although there can hardly be anyone who has not heard of "St. Ivel" Lactic Cheese, it is perhaps not so well known that this famous name is to be found also on cream jars, sandwich paste pots, pies, and sausages, and well as honey, soup, Christmas puddings, mincemeat, tongues and briskets, savouries, lemon curd, and chutney, and a number of other food products described in a booklet recently published by Messrs. Aplin and Barrett.

Suggestions are given for items for each meal in the day and also for picnics and hiking, which latter hints should be very popular.

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## Heating and Ventilating

"Data for Heating and Ventilating Engineers" is the title of a folder (Publication No. S.F. 130) sent us by Messrs. Davidson and Co., Ltd., Sirocco Engineering Works, Belfast, Northern Ireland.

In it are given a friction chart showing the resistance of air ducts and elbows, a psychrometric chart, a table showing equalisation of pipe diameters, and another giving weights of galvanised iron pipe and elbows.

The data should be very useful to engineers.

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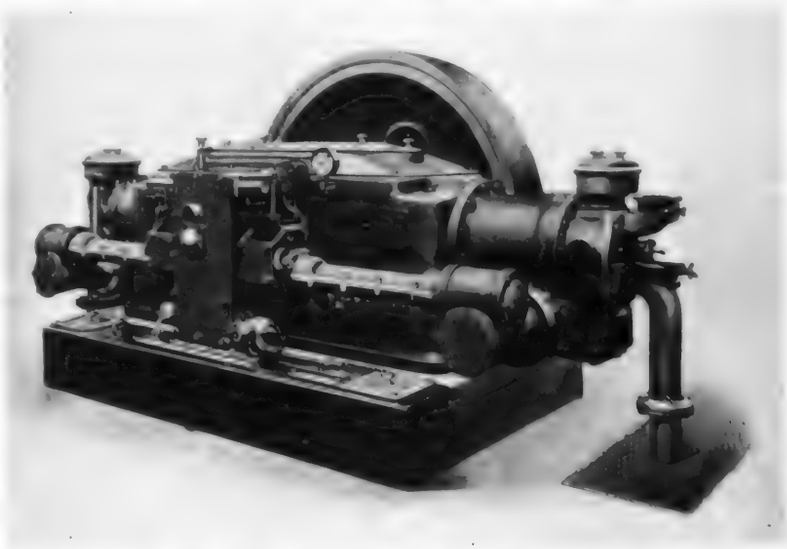
## Picnic

Messrs. Arthur Holden and Sons, Ltd., of Birmingham, makers of the well-known Zinnatine lacquers, held their annual picnic on Saturday, June 23, when a party of nearly 200 entrained for London on the 8.10 a.m. from Birmingham. On arrival at 10.30 a.m. motor coaches were waiting to convey them to the Houses of Parliament and Westminster Abbey, where a most pleasant and profitable hour was spent. After a sightseeing tour round the principal streets of London, lunch was taken at the Florence Restaurant in Rupert Street.

At the luncheon Mr. Matthison and Mr. P. M. Sturge — joint Managing Directors—welcomed their guests, and in response Mr. A. Pope, who has been their head varnish maker for thirty years, made a happily phrased reply.

Mr. Sturge, during the course of his speech, mentioned the good trading year which had been enjoyed by the Company, and that the picnic had been arranged, free of charge to all those present, as an acknowledgment of the firm's appreciation of their hard work.

The afternoon was spent at the Zoo, and later the coaches conveyed all back to Euston, where the seven o'clock to Birmingham was caught, and the whole party enjoyed a very good supper en route.



The "Brush" cold starting Diesel Engine.

# INFORMATION and ADVICE

**Silver Coating — Powders — Marmalade — Coconut Treacle — Carbonated Drink Pressures — Regulations, Packing — Regulations, Preservatives — Rancidity — Lemon Curd — Jelly Crystals — Insecticides for Dried Fruit — Vanilla Essence**

## Silver Coating

1,629. *Will you kindly supply instructions for the silver coating of comfits or dragées?* (England.)

The following account of American methods is interesting:

Considerable skill and strict attention to details are required to obtain satisfactory silver coating on dragées. Humidity of air in room in which operation is carried out is very important factor. There are various methods, but the one employing gelatin is favoured by some pill manufacturers. Pills may also be coated with aluminium.

Silvering operation should be carried out only in clean vessels. Gelatin solution is first prepared by softening 25 parts gelatin with little water and cooking softened mass and then passing liquid gelatin through filtering cloth. Gelatin is then mixed with 60 parts acetic acid in suitable flask. The smaller the original sugar-coated pills, the thinner the gelatin solution must be and the more acetic acid must be added. Silvering process should be carried out in room in which air is dry and as cold as possible, compatible with comfort of workers. Dragées are moistened with gelatin solution in ordinary kettle and operation is carried out by hand. Only smooth dragées should be used, because a fine, metallic lustre can be produced only on smooth surface. Dragées must be perfectly dry before silver coating is applied. Silvering is accomplished by addition of silver powder to glass-lined kettle containing pills. This kettle is made so that it can be rotated and silvering takes place while kettle is in motion. Uniform speed of 80 to 100 r.p.m. is important. Pills must run out of kettle quite dry and then they are further dried on glass plate or dish. If silver coating does not possess required lustre, then dragées are allowed to remain few days and are then run into glass-lined kettle again and moistened with little acetic acid. Hermetically sealed containers must be used for storing silvered dragées, because they lose lustre on contact with air.

Another good method for silvering dragées is to prepare a little gum solution or white syrup with which sugar-coated pills are moistened. They are then placed in box which is filled with few pieces of silver leaf. Box may be made of porcelain, glass, horn, or wood. It is closed and rotated so that dragées roll around in it in continuous circle. Rotation continues as long as any metallic particles remain unattached to pills. More silver leaf is added as may be necessary and rotation of box is continued until perfectly silvered pills are obtained. If dragées contain medicaments which react with silver, such as for example sulphur compounds, a collodion coating is applied before silvering or before sugar coating pill. Thus the pills may be placed in roomy dish and mixture of 2 parts collodion and 1 part ether is poured over them. Pills are rolled in solution until solid, uniformly lustrous spotless coating is obtained.

1,630. *We have an enquiry from one of our customers as to what would be the best "filling medium" to add to a concentrated orange juice in order to solidify the mixture sufficiently so that it could be used as a filling for chocolates.*

*If you could give us any information on this matter we should be very much obliged.* (Manchester.)

Sources of expert information were suggested.

## Powders

1,631. *We are looking for a book describing the methods of manufacturing custard powder, blanc mange powder, cake powders, ice-cream powders, and other products.* (Paris.)

As far as we know there is no book published giving manufacturing processes for custard powders, etc.

Custard powders and blanc mange powders are merely cornflour or cornflour mixed with rice flour or other flours suitably coloured and flavoured. I have previously given particulars of the methods and ingredients employed. The chief difficulty in their preparation is obtaining a uniformly coloured and flavoured product. There are many ways of achieving this; perhaps the commonest is to mix colour and flavour with a small portion of the flour, then to dry and grind it, and mix it in one or two stages with the rest of the flour. This may be done in the usual type of Gardner mixer. Another way is to add the colour and flavour to the flour while it is being mixed in a mixing machine, employing the special type of Gardner mixer fitted with spraying device.

With regard to cake powders, there are many possible recipes depending on the type of cake required. They are generally self-raising flour—*i.e.*, flour mixed with the required proportion of baking powder—together with fruit and fat.

With regard to ice-cream powders, reference should be

made to the article which we published in the last issue. We have in hand a comprehensive article on baking powders which will be published as soon as space permits.

1,632. *I am thinking of starting an ice-cream business, and would like some information from you. I would like you to give me the address of any firms who make refrigeration plants. I would also like the address of a reliable firm who make ice-cream powder.* (Salisbury.)

We have been looking into this matter, but we are afraid that it is rather too large a subject to deal with by correspondence.

We think the best thing we can do is to refer you to the article on the subject of ice-cream powders which appeared in our June issue, and also to the books published on the subject, such as—

*The Making of Ice-Cream*, by Feltham.

1,633. *I should be obliged if you could give me the name of the best book on the manufacture of ice-cream. I take it that American publications in this direction will be the most up to date.*

*I should be glad also if you would let me know if there is any periodical literature on the subject of ice-cream manufacture. Please let me know names of British manufacturers of ice-cream plant.* (Dublin.)

Information was supplied.

## Marmalade

1,634. *We should be grateful if you could supply a recipe for a cheap marmalade, using fruit pulp.* (London.)

I am not quite clear from your enquiry exactly what you want. In any case, it would be impossible to give full instructions for the manufacture of marmalade in the course of a letter. I would refer you to *The Food Industries Manual,* which contains a general account of the manufacture of marmalades.

In the case of jelly marmalade—if that is what you require—this simply means the preparation of a jelly from orange juice and sugar, incorporating in it shredded peel which has been syruped. As an example of the procedure involved, the following note might be useful:

*Jelly.*—Dummies are removed from a batch of 5 cwt. of oranges. To each 112 lb. of dummies add 22 gal. of water and simmer for 45 minutes. Filter or drain through jelly bags. To the juice add 170 lb. sugar and 10 lb. glucose. Bring to the boil and skim and filter bright.

*Peel.*—About a quarter of the peel removed from the oranges is shredded in a peel shredding machine, whereby the pith is first stripped from the rind, and then the rind is cut into the required size. The shreds are just covered with water, and are kept so covered while they are boiled until tender, not less than an hour. They are then slowly cooled, drained, and afterwards placed in a cold sugar syrup of 20° Bé.

In this they are allowed to remain for 24 hours, after which both the shreds and syrups are transferred to a pan, boiled, and filtered.

*Marmalade.*—Distribute the jelly, prepared as above, among four boiling pans. To each add 2 lb. syrup shreds prepared as described; boil to 223° F.

For the manufacture of ordinary marmalade, reference should be made to *The Food Industries Manual* and to previous issues of FOOD MANUFACTURE.

## Coconut Treacle

1,635. *I am sending you to-day a sample of coconut treacle, and shall be obliged if you will let me have your opinion as to whether a market for this commodity could be found in the U.K.*

*This article ferments in storage and very often bottles burst. What treatment or preservative do you think would prevent such a possibility?*

*Do you think that the addition of any flavour would add to its appeal?* (Ceylon.)

We have now received the sample, but I am sorry to say that it has evidently undergone fermentation during transit, and nothing more than the empty package arrived here, so therefore it is not possible to make an examination of it.

Of course, without having a sample before me I cannot make any useful suggestions. All I can do is to ask that you give me an account of what process is followed in the preparation of this product, as from this it may be possible to suggest where you are making an error.

The only other useful suggestion I can make is to direct your attention to the two articles on honey spoilage in the May and June issues of FOOD MANUFACTURE. You will find there a discussion of the factors which are responsible for the spoilage of honey, and it is possible that much the same factors will operate in the spoilage of your own product.

Evidently mould spores or other micro-organisms capable of fermenting the sugar, possibly aided by too high a water content and the presence of protein matter, have gained access to the product.

## Carbonated Drink Pressures

1,636. *Wanted to know: Maximum and minimum pressures to be expected in bottles of carbonated drinks.* (Staffordshire.)

With reference to your enquiry regarding pressures to be expected in carbonated beverages, these vary considerably.

The minimum bottling pressure can, we think, be taken at about 30 lb. to the square inch. This is rather a low figure, but we understand there are a few cases where such pressures are used. We do know of instances where 40 lb. is employed.

The maximum may go up as high as 120 to 130 lb. per square inch in the case of soda water and other artificial mineral waters.

Sweet drinks, such as lemonade, etc., usually run about 80 lb., and a slightly higher pressure is used for drier lines.

## Regulations—Packing

1,637. *At the request of our Ministry of Industry and Home Trade, I am drawing up a comprehensive account of the regulations regarding retail trade in England.*

*I am familiar with a number of Acts and Orders affecting the sale of food, but should be very much obliged if you would assist me in clearing up the three following points:*

1. *Is there a law under which any prepacked foodstuffs must bear the name and address of the manufacturer or of any other person who may carry out a process of mixing, preparing, or packing?*

2. *Apart from those made under the Merchandise Marks Acts, what statutory rules or orders are there regarding misrepresentation as to the country of origin of foodstuffs and the like, such as port wine?*

3. *Where can I find all regulations as to the nature of the immediate packing of foodstuffs? I understand there is, for instance, an Order prohibiting the use of lead or other noxious substances in wrappers.* (Belgium.)

So far as we know, in this country there is no law requiring that prepacked foods must bear the manufacturer's or other person's name and address. In fact, large quantities of goods are sold in shops, quite legitimately, without any name and address on the package.

For export goods, of course, the requirements of the overseas country concerned, which often require a name and address, would apply.

Apart from the Orders in Council under the Merchandise Marks Act, there is the general provision in the 1926 Act itself which requires that *any* imported goods to which the name or trade mark of a British manufacturer, dealer, or trader is applied, must also carry an indication of the place of origin, unless the goods are for re-export.

As regard port and Madeira wines, the use of these descriptions is taken to imply that they are of Portuguese or Madeira origin, under the Anglo-Portuguese Commercial Treaty Act, 1914.

Other wines and foodstuffs with names denoting special origin would have to be the genuine produce of the place indicated, under the Merchandise Marks Act.

There may now be certain requirements as to marking with place of origin in connection with import duties. You could no doubt obtain information on that point from the Board of Trade.

There are no regulations in this country as to the nature of the immediate packing of foodstuffs, and therefore there is no Order prohibiting the use of lead, etc., in wrappers. The wrapping of bulk tea in lead, for instance, is quite a common practice.

The remarks in the first paragraph as to export goods apply here also.

## Regulations—Preservatives

1,638. *Please inform us if you are aware that iodine tinct. is being used by injecting into bacon with the object of enabling it to keep sweet longer during the hot weather. Personally, we should have thought that its use would be contrary to the Public Health (Preservatives, etc., in Food) Regulations, 1925. If, however, you can enlighten us on the subject, we shall be very pleased indeed for any information you can furnish to us.* (Manchester.)

We put these questions before the Ministry of Health, and they state that iodine is a preservative substance and therefore would be an infringement of the preservatives regulations.

## Rancidity

1,639. *We shall be glad if you will advise us whether shredded beef suet with rice flour will keep well and retain its properties and not bleach or turn tallowy if packed in more or less airtight containers. We are given to understand that shredded suet keeps in better condition if packed in the usual form of carton, which is not airtight and allows the air to get in and out.* (London.)

It would be interesting to know upon what authority it is argued that the fats will keep better in presence of air than when packed under vacuum. Experimental evidence points the other way. But other factors enter for consideration, such as the nature of the container and the exposure of the fat to light.

American investigators have shown that lard in contact with metals develops rancidity even when the metal itself is apparently not attacked.

On the other hand, rancidity did not develop in the lard not in contact with the metal when the lard was protected from the light.

The same arguments surely apply to beef suet. It would seem that the best conditions for keeping beef suet are for it to be packed in airtight opaque containers which will not allow the entrance of light, unless it be green light. It has been found that light, with the exception of green light, is very active in promoting rancidity. If metal containers are used the suet should be wrapped in vegetable parchment or similar paper, so as to keep it free from actual contact with metal. The use of rice flour helps in this respect.

## Lemon Curd

1,640. *Will you kindly give the causes of the cracking of lemon curd and how to avoid it?* (Lancs.)

Cracking may be caused by using the wrong kind of cereal flour and by using an excess of wheat flour. It may also be remedied by incorporating pectin in the formula. Sometimes gelatin is used, but pectin is better, as gelatin favours mould growth. Filling the jars at too high a temperature may be a contributory cause.

1,641. *Please send particulars of peanut roasting, blanching, etc., and of plant for the preparation of salted peanut kernels, including the salting process.* (London.)

These were sent.

## Jelly Crystals

1,642. *Kindly supply formula for jelly crystals.* (London.)

We have dealt with this matter previously. Briefly stated, jelly crystals are made from a mixture of castor sugar, powdered gelatin, and tartaric acid, in the proportions of roughly 20 : 5 : 1, together with suitable amounts of flavouring and colouring matter. The method of manipulation is all-important, especially the uniform in-

corporation of the flavour and colour. A flavoured and coloured base is first prepared which is mixed in one or two stages with the main batch. Care must be taken to have dry, finely sieved materials before mixing.

## Insecticides for Dried Fruit

1,643. *We have had an enquiry from a customer of one of our branches with reference to what is termed a " bisulphide treatment " for killing the larvæ of moths in dried fruits such as prunes, apricots, nectarines, and other fruits imported from Africa and other parts. The only information the customer has given us is that he has been advised to treat the dried fruits with " bisulphide " in an iron drum. As we have not been able to find any reference to this form of treatment, we should much appreciate any help you can give us. We have looked through back numbers of* FOOD MANUFACTURE, *but have not found anything there bearing on the particular point. The term " bisulphide " rather suggests the possibility of treatment with carbon bisulphide vapour at low concentrations, but it is possibly an error for bisulphite.* (England.)

The method best suited to the sterilisation of dried fruits or similar produce infested with the caterpillars of the fruit or meal moths will naturally depend on the circumstances of each particular case. If the amount to be dealt with is small and not very tightly packed, and the fumigation can be carried out without danger of fire, then carbon bisulphide should give good results very cheaply and without damaging the produce.

Use an iron container which can be rendered fairly airtight—a large dustbin fitted with a gasket made of split rubber tubing serves very well—and pour the liquid over blotting paper or a cloth spread above, but not in contact with, the fruit. Purified carbon bisulphide should be used at the rate of about 100 c.c. per 6½ cu. ft. (reckoned on empty capacity of chamber), and fumigation should last 24 to 48 hours according to temperature. Complete vaporisation of the liquid and the penetration of the gas into the produce will depend to a great extent on the temperature at which the operation is carried out. This should not be below 60° F. The gas is highly inflammable and the most careful precautions should be taken against fire. Thorough aeration is needed to rid the produce of the odour of the gas, which entirely disappears eventually.

If the fruit is tightly packed in the usual wooden cases it is doubtful whether sufficient penetration of the gas to kill insects embedded in the mass of fruit would be obtained without employing a partial vacuum. This necessitates a specially constructed chamber to which an air pump can be fitted and which should have a safety device to guard against bursting.

Quantities which are obviously too large to be dealt with by these methods should be fumigated in a sealed room or large chamber with ethylene oxide, and the services of a reliable fumigating firm obtained for the work.

A method of insect sterilisation which deserves greater popularity is that of low temperature storage. All stages of the stored product moths of the genera *Ephestia* and *Plodia* succumb after exposure to 5° C. (23° F.) for about 10 days. With modern cold storage facilities it is often

possible to avoid fumigation by storing the affected produce for a few weeks in a cold chamber.

The full-grown caterpillars of these moths have a habit of wandering away from the produce and seeking crevices in the floor, wall, or ceiling of the building for shelter during pupation, or, in the autumn, for hibernation during the winter. In this way warehouses, factories, and stores become infested and the insects are spread to other produce.

## Vanilla Essence

1,644. *Will you kindly inform me if the following formulæ are satisfactory for preparing vanilla essence:*

(a) 100 *dr. of vanillin dissolved in* 15 *lb. of* 96 *per cent. ethyl alcohol and then added to* ½ *pint distilled water.*

(b) 0·7 *per cent. vanillin solution or* 0·583 *per cent. vanillin and* 0·117 *per cent. coumarin in alcoholic solution. Add water and tint with caramel or prune juice.* (Japan.)

They are quite satisfactory. There is no definite strength for such essences; they can be made up as strong as required, depending upon the price at which the essence is to be sold and the best concentration for the particular purpose for which the essence is made up.

(*a*) The one mentioned as being taken from English books is quite a common strength—viz., 2½ per cent. This is based on the usual strength of vanilla in the bean —*i.e.*, it is present to the extent of about 2½ per cent.

(*b*) The American formula is equivalent to a 10 per cent. vanilla essence, assuming that 0·7 part of vanillin is equal to 10 parts of real vanilla from the point of view of flavouring strength.

The inclusion of coumarin is not recommended; the coumarin is liable to give the essence a harsh taste or even a soapy effect; it is a common constituent of soap perfumes.

The solubility of vanillin in alcohol is as follows:

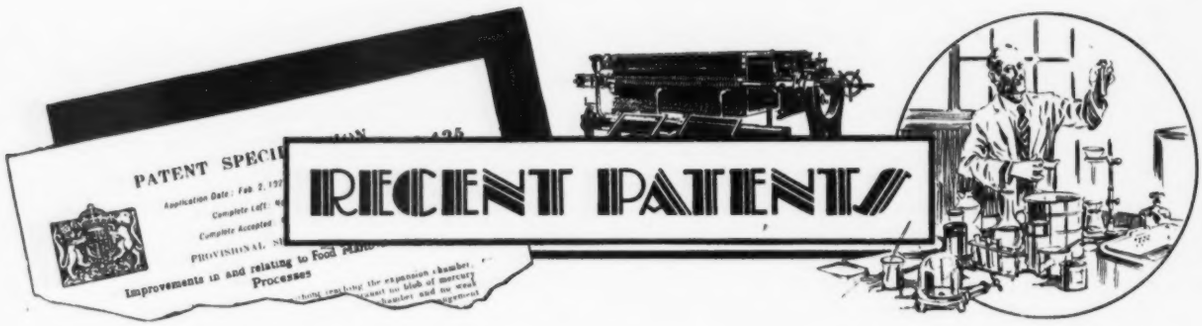
1 part vanillin dissolves in 2·5 parts of ethyl alcohol 90 per cent.

1 part vanillin dissolves in 10 parts of ethyl alcohol 45 per cent.

In isopropyl alcohol the solubility is—

1 part vanillin dissolves in 1·25 pure isopropyl alcohol.

1 part vanillin dissolves in 5·0 parts 50 per cent. isopropyl alcohol.




*These particulars of New Patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The "Official Journal of Patents" can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).*

### Latest Patent Applications

16489. Aplin and Barrett and The Western Counties Creameries, Ltd.: Cheese, etc. June 2.

16801. National Bread Wrapping Machine Co.: Wrapping machines. June 6. (United States, June 6, 1933.)

17005. Sardik, Inc.: Manufacture of pectin. June 8. (United States, July 11, 1933.)

17346. Ryan, J. T. S.: Preservation of foodstuffs. June 12. (Australia, June 12, 1933.)

17779. Komm.-Ges. f. Fa. M. Neufeld and Co.: Treating fruits, etc., containing oil and fat. June 15. (Germany, September 22, 1933.)

17780. Komm.-Ges. f. Fa. M. Neufeld and Co.: Treating fruits, etc., containing oil and fat. June 15. (Germany, June 7.) (Cognate with 17779.)

17811. Rewald, B. A.: Production of stable aqueous lecithin compositions. June 15.

17821. Steenken, J. A.: Manufacture of bread and rusks. June 15. (Holland, October 14, 1933.)

17822. Steenken, J. A.: Manufacture of bread and rusks. June 15. (Holland, May 4.) (Cognate with 17821.)

18391. Duttweiler, B., and Raw Products, Ltd.: Cheese. June 21.

18550. Banfield, W. T., and Bennion, E. B.: Production of brown meal or bread.

18771. Hanseatische Mühlenwerke Akt.-Ges.: Production of products comprising vegetable phosphatides. (Germany, December 13, 1933.)

18772. Hanseatische Mühlenwerke Akt.-Ges.: Production of products comprising vegetable phosphatides. (Germany, April 5.) (Cognate with 18771.)

18820. de Boer, F.: Apparatus for pasteurising milk. (Holland, June 30, 1933.)

18977. Fraulo, A., de Luca, E., and Micallef, G. C.: Manufacture of ice-cream, etc. June 27.

### Complete Specifications Accepted

411,163. Ashby, W. R. C.: Process and apparatus for the preparation, cooking, and canning of chickens and other birds and animal flesh.

411,188. Hall, Ltd., J. and E., and Farmer, J. D.: System of preserving or conditioning perishable goods contained in a closed vessel.

411,308. Deutsche Staerke-Verkaufs-Genossenschaft Eingetragene ges.: Preparation of a dry product from glucose syrup.

411,318. Sparklets, Ltd., and Heyl, G. E.: Preservation of carbonic acid in beverages stored in barrels.

411,358. Schramm, O., Lauenstein, O., and Lauenstein, W.: Temperature-measuring appliance, intended more particularly for use with chocolate, sugar, and like masses.

411,611. Stich, E.: Process for producing yeast and spirit from sugar-containing liquids, more particularly molasses.

411,822. California Fruit Growers' Exchange: Method of conserving fruit juices and products produced thereby.

411,970. Chivers and Sons, Ltd., and Harradine, A. C.: Receptacles or containers for fruit.

412,035. Myers, H. C.: Process of preparing a food product.

412,086. Cocker, M.: Moulding of composite edible rolls.

412,121. Boggild, C. B. K., and Jacobsen, M. (trading as Boggild and Jacobsen): Machines for the manufacture of filled chocolates.

412,224. Pollak, J. E. (Hanseatische Mühlenwerke Akt.-Ges.): Production of phosphatide products.

412,323. Snodgrass, E. N.: Edible frozen confection.

412,385. Continental Can Co., Inc.: Flaked vegetable tissue for extraction and method of making the same. February 11, 1933.

412,387. Continental Can Co., Inc.: Flaked vegetable tissue for extraction and method of making the same. January 25, 1933.

*Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.*

### Abstracts of Recent Specifications

*Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per group volume, or in bound volumes price 2s. each.*

407,821. **Decorticating brazil nuts, filberts, almonds, etc.** Bizzell, C. K., and Bizzell, J. E., 647, Newark Avenue, Elizabeth, New Jersey, U.S.A.

Shelled nuts are passed through a heated aqueous solution of an alkaline reagent for a period of time insufficient to cause any substantial chemical reaction between the nut meat or the oils therein and the reagent. In a specific example the solution contains 6 oz. of sodium carbonate to a gallon of water, and the nuts are immersed in this solution (at its boiling point) for from one to seven minutes; the treated nuts are subjected to a stream of water under pressure and preferably at a temperature of 160° to 200° F. until the skins and associated saponified matters are removed; any alkalies absorbed are neutralised by immersing the kernels in a weak, warm solution of acetic, citric, or other acid, after which the kernels are washed in clear water and dried by a current of hot air preferably under reduced pressure or steamed. One ounce of glycerine may be added to the sodium carbonate solution, the time of immersion then being less. The shelled nuts may be preliminarily impregnated with a liquid fatty material.

407,973. **Colouring foodstuffs in canning.** Imperial Chemical Industries, Ltd., Millbank, London, and Hill, F., Hexagon House, Blackley, Manchester.

In colouring foodstuffs such as fruit and vegetables preserved by canning the dyestuff is applied in the presence of an added organic acid such as citric or tartaric acid. Dry mixtures of "Lissamine" Green V concentrated ("Lissamine" being a registered trade mark) or "Edicol" Carmoisine WS ("Edicol" being a registered trade mark), of Disulphine Blue A and "Edicol" Tartrazine, and an organic acid, preferably citric or tartaric acid, may be prepared and used in making up the canning liquor. Specification 325,622 (Class 49) is referred to.

(*Continued on page* 294.)